NEW HAMPSHIRE CZM PROGRAM

W.P.

07158

New Hampshire

Coastal Zone Management Program (March 31, 1976)
Final Report
First Program Year

Grant Period June 30, 1974 to Dec. 29, 1975

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The coastal zone definition, as recommended below, was arrived at through the following process: consultation was had with many agencies in federal, state, and local government; a review was made of the literature to determine what other states had done and how how they arrived at their determinations;[1] and several New England and national conferences were attended where the matter was discussed.[2]

The starting point for the deliniation is the definition of a coastal zone contained in the federal Coastal Zone Management Act of 1972:

> (a) "Coastal zone" means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends, in Great Lakes waters, to the international boundary between the United States and Canada and, in other areas, seaward to the outer limit of the United States territorial sea. The zone extends inland from the shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zones are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents.
>
> PL 92-583 §304

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New Hampshire

Clearly then, New Hampshire's offshore waters, its estuarine waters, and its beaches, and its saltmarshes are a part of the coastal zone.

The difficult thing to ascertain was how much of the land area of the state is in the coastal zone. Several approaches were used to generally define the area:

1) What statewide policies exist relating to energy, the siting of power plants, surface and subsurface mineral extraction, overall land and water conservation that affect the coastal area?

2) What areas has the state heretofore defined as coastal for various purposes?

3) What natural features of the landscape would tend to define an area as coastal?

4) In what places do residents think of themselves as living in the coastal area?

A discussion of each of these approaches follows:

1) <u>What statewide policies exist relating to energy, the siting of power plants, surface and subsurface mineral extraction, overall land and water conservation that affect the coastal area?</u>

A) A final recommendation for coastal zone boundaries are derived after consideration of New Hampshire energy policies, the siting of power plants and other major water-dependent facilities, surface and subsurface mineral extraction policies, overall land and water conservation policies and other appropriate matters. New Hampshire has no unified energy policy although it does have power plant and oil refinery related siting policies which are effective in the coastal zone. The state has no overall surface and subsurface mineral extraction policy, neither does it have any overall land and water conservation policy.

The state does have elements of all these kinds of policies and seems to be moving toward adoption of all of these kinds of policies. The 1975 session of the legislature saw introduced and defeated measures which would have established overall policies in all of these areas. Some of these bills were defeated by very

narrow margins (A bill which would have established several major land use policies failed by one vote). Many other state actions, however, have had a special impact on the coastal area of the state. These were reviewed and assisted in the derivation of the recommended boundaries.

Energy and Energy Siting Policies: Despite eighteen months of avid concern about constructing an energy policy the state cannot be said to have "adopted" any comprehensive energy policy. The legislative branch has adopted several pieces of a policy, the executive branch has proposed various other elements of a policy, some of which have taken on the nature of directives to the state agencies, others of which are in the form of suggestions to the state's citizens, and others of which have met with official and public resistance. Almost all impact on the coastal zone.

Legislated policies are bulk power generating and oil refinery siting legislation. Tthe state has recent statutes (RSA 162F and RSA 162H) which provide state review of proposals to site bulk power generating facilities (over 100 Kilovolts) and oil refineries anywhere in the state. By virtue of their nature, both kinds of facility are likely to locate in the coastal zone. Both statutes, although differing in the details, call for consideration of the effect of esthetics, historic sites, air and water quality, the natural environment, the public health and safety and the orderly development of the region. The oil refinery siting statute also calls for consideration of the effect on coastal and estuarine waters, (RSA 162F: 8 I, RSA 162H: 9 (a)) in arriving at a determination of suitability. No other legislated policies are apparent.

The Executive branch has promulgated a series of energy policies being actively pursued by executive departments. They include: A. Encouragement of oil related development in the coastal zone, to include (i) refineries, (ii) petrochemical complexes, (iii) supertanker terminals, (iv) pipelines for oil transport from offshore, (v) offshore drilling on the Outer Continental Shelf. Pursuant to these

policies efforts have been made to (i) gauge public opinion on desire for refineries through advisary-opinion questions on the 1974 town meeting and questions of seacoast local officials, (ii) locate suitable refinery sites from a physical point of view, (iii) attempt to convince the public at large of the necessity for such facilities. Testimony has been given by the Governor's office at federal hearings on energy related issues to encourage their siting quickly, and in New Hampshire if possible.

B. Encouragement of use of wood as a fuel through public relations efforts.

C. Encourage conservation of energy resources by lowering speed limits and thermostats, closing public buildings in the dead of winter and encouraging use of insulation.

D. Encourage the use of atomic energy by expediting the siting processes of a facility now being proposed for Seabrook, New Hampshire.

E. Waive air pollution regulations to permit burining of available high sulphur fuels and permit generating stations with inoperable pollution control devices to generate power without them.

Analysis: Energy related policies recognize the dependence on the coastal zone as a place for energy related activity. Legislated policy recognizes the conflicts of the coastal zone in siting process and attempts to deal with them by placing on the siting board persons from agencies with interests in the coastal zone including:

> the executive director and the chief aquatic biologist of the water supply and pollution control commission, the commissioner of the department of resources and economic development, the director of fish and game, the director of the office of planning, the chairman of the water resources board, the director of the radiation control agency, the executive secretary of the air pollution control commission,

the commissioner of the department of health and welfare, the director of the division of parks, and director of the division of resources, the chairman of the public utilities commission. Source: 1971, 587:3, eff. Amendments-1973. Re-enacted section. (RSA 162-F:3)

B. Port Facilities: The state has a legislated policy relating to port facilities. It is embodied in the legislation creating the New Hampshire Port Authority.

"The New Hampshire state port authority, in cooperation with the department of resources and economic development, shall:

I. Plan for the maintenance and development of the ports, harbors and navigable tidal rivers of the state of New Hampshire from the head of navigation to the seaward limits within the jurisdiction of the state, in order to foster and stimulate commerce and the shipment of freight through the state's ports and, as an agency of the state, to assist shipping, and commercial and industrial interests as may be desirous of locating in tidewater areas of the state; as well as to encourage the establishment of accommodations for the boat traveler, the area boat owners, the pleasure fishermen, and others who pass up and down our coastline or in its tributaries;

II. Aid in the development of salt water fisheries and associated industries;

III. Cooperate with any agencies or departments of the federal government in planning the maintenance, development and use of the state ports, harbors, and navigable tidal rivers.

IV. Plan, develop, maintain, use and operate air navigation and land transportation facilities within a fifteen mile radius of the port authority headquarters at Portsmouth. Cooperate with departments, agencies or commissions of the federal, state or local governments and accept grants, aids or services from such agencies in the carrying out of this purpose. Such authorization relating to air navigation

and land transportation facilities shall include and be governed by all other provisions of this chapter. RSA 27-A: 2

The board is composed of members, five of whom shall be appointed by the governor, with the advice and consent of the council. At least three of said appointive members shall be residents of the cities and towns of the seacoast region and tidal waters and each shall serve for a term of five years, providing that of the first appointments hereunder one shall be appointed for a term of one year, one for a term of two years, one for a term of three years, one for a term of four years and one for a term of five years. Said members shall serve until their successors are appointed and qualified. Any vacancy occurring in the membership of the appointive members shall be filled by the governor and council for the unexpired term. In addition to the five appointive members the following officers shall be, by virtue of their offices, members of said board: the commissioner of the department of resources and economic development, and the president of the seacoast regional development association. RSA 271-A: 1

Analysis: The Port Authority has used its powers to control moorings and docking and navigating facilities for recreational, commercial fishing and industrial uses.

C. Surface and Subsurface Mineral Extraction. 1. On Land. The state has no policy on surface or subsurface mineral extraction except that municipalities are assumed to have the power to control such extraction. Most municipalities within the coastal zone have exercised this power to control rock quarrying, sand, gravel and clay excavation and removal. No other currently commercially valuable minerals have been located in the Seacoast (although granite was mined in the area a century ago).

2. Water. The state has clear authority over excavation of minerals from

under the state's waters. Such an excavation is subject to two approvals:

a. The special Board of the Water Resources Board must approve under RSA 483-A: 1 (a) supplement.

b. The Governor and Council must approve under RSA 4:40 (a) - (e) supplement.

A recent New Hampshire Supreme Court decision, Sibson vs. State of New Hampshire (___NH___, 1975), has affirmed the power of the state to legislatively protect critical salt marshes through the police power, giving great strength to the state legislative policy on wetlands.

No policy is evident on attitude toward offshore mineral extraction other than that it shall be controlled by the state.

C. Overall land and water conservation policies. The state has few overall land and water conservation policies. It has no state adopted land use plans. It does have state adopted Basin Plans which set water quality standards under §303 of the federal Water Quality Act Amendments of 1972 and prior federal legislation and state legislation to implement the goals of the plans. The state also has an adopted set of air quality standards.

The state has long enabled substate districts to adopt land use plans under the aegis of regional planning commissions. The coastal zone regions have done so. These plans are advisory only.

The has long enabled municipalities to adopt land use plans and land use control measures. Many of the coastal municipalities have adopted such plans and all have adopted land use control measures.*

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* See Report #4 Zoning Controls Analysis, Southeastern New Hampshire Regional Planning Commission (1975) and Strafford Regional Planning Commission, Zoning Composite (1975).

No general controls are exercised over water use - various departments and agencies regulation various aspects of water use as reported above.

2) What areas has the state heretofore defined as coastal for various purposes? (See Map)

A) Planning districts - the ocean or estuarine waters abut 2 regional planning districts - the Southeastern and the Strafford Regional Planning Commissions districts. These two district regions have been merged with a third, the Southern Rockingham to form the Strafford-Rockingham Regional Council.

B) Tourist promotion districts - one state recognized tourist promotion and economic development district exists; it is entitled the Seacoast Regional Development Association.

C) The New Hampshire Department of Fish and Game has a seacoast district #6.

D) The New Hampshire Port Authority jurisdiction is defined as circle with a 15 mile radius from its headquarters at Portsmouth.

E) County boundaries - the boundaries of Rockingham and Strafford Counties are identified.

F) Legislative districts are based on municipal boundaries.

G) Districts of the New Hampshire Department of Public Works and Highways.

None of these boundaries are totally coterminous although several share boundary lines at various points.

The regional planning commission boundaries, for example, include all of Strafford County but only about two thirds of Rockingham County. The only two boundaries which one might assume were drawn based primarily on someone's conception of the extract of the "Coastal" area, are that of the New Hampshire Port Authority, and that of the Seacoast Regional Development Association. Although similar in their northerly area - both include Somersworth, Dover, Madbury and Lee, they diverge thereafter, the Port Authority's jurisdiction encompassing all of those municipalities abutting salt water, the Development Association's extending westward to include Atkinson, Hamptstead and Sandown.

Similar comparisons can be made for any of the other outlined districts. The Fish and Game district logically includes all municipalities abutting salt waters but also includes several other inland municipalities as well. The highway department district extends further inland but there is no reason to suppose that the boundaries should have a logical connection with coastal waters.

In summary, examination of existing political boundaries demonstrates that no single, except perhaps of that of the Port Authority, has as a primary purpose, a relationship to coastal waters.

3) What natural features of the landscape would tend to define an area as coastal?

A) River Basins - the Piscataqua and coastal watersheds (as defined as a Basin by the Water Supply and Pollution Control Commission in accord with 303(e) of the Water Quality Act Amendment of 1972) approximate the Southeastern and Strafford Regional Planning Commission borders. A portion of the Merrimack basin is included in the area of the Southeastern and Southern Rockingham planning regions and is only 10 miles from the ocean. The Merrimack is a very large basin, however, and, considering the language of the federal statute, an inclusion of the whole Merrimack basin is clearly inappropriate.

Portions of the Merrimack basin that include the Pow Wow, Little, and Spicket River watersheds are similar to the upper reaches of the Piscataqua Basin in potential effects on coastal waters, i.e. they are located at similar distances from estuaries and ocean waters, and land uses there would have a similar effect on coastal waters.

B) Coastal Plain - the western edge of the coastal plain was determined from geologic and topographic maps.

C) Climate - no clearly defferentiated micro-climates were discovered which might have resulted in a determination.

In summary, the natural features of the landscape do not clearly define an area as coastal. Parts of the Merrimac River basin are clearly as "coastal" as are the upper reaches of the Piscataqua.

The western edge of the coastal plain is ill defined in New Hampshire. The exact edge of the coastal plain varies within a mile or so depending on the definition used - whether it be defined by soil type, bedrock type, average slope, or other means. In any event, it is approximated by Route 125 from the Massachusetts border to Rochester. Route 125 follows the abandoned route of a railroad which was laid at the westerly edge of level land in the 19th century.

4) <u>In what places do residents think of themselves as living in the coastal area</u>?

A) A survey is underway by the University of New Hampshire funded by the Sea Grant Program which will assist in determining the answer to this question. No answers are available as of this writing.

<u>Summary - existing definitions</u>

No existing single district was formed with the goals of the Coastal Zone Management Act in mind. All of the many districts in existance offer some assistance arriving at a boundary. Examination of the accompanying map reveals some basic

similiarities - the Port Authority limits, the Fish and Game Commission district and the coastal plain as roughly defined by Route 125, are similar in location, and enclose, roughly, the municipalities with frontage on salt water.

County boundaries, regional planning commission boundaries and the aforementioned watershed boundaries roughly approximate each other at twice the distance inland of the boundaries citied in the preceeding paragraph.

Another incidental, consideration is the existance of base maps at a suitable scale for planning purposes. NOAA has rather strongly suggested use of the new 7½ minute series by the United States Geological Survey (USGS) at the scale of 1:24,000. These maps are available only for the area approximating the coastal plain.

Definition

In order to suggest a boundary, certain assumptions had to be made about the nature of a coastal zone management program in New Hampshire.

The first set of assumptions is based on the existing governmental structure and attitudes toward that structure:

1) municipalities, not counties, and not the state, have been the basic land use decision making bodies in New Hampshire;

2) the state legislature is strongly inclined to defer decisions to the municipal level;

3) all coastal municipalities have a histroy of using land use control devices (such as zoning and subdivision regulations);

4) all coastal lands fall within the jurisdiction of a municipal government;

5) offshore waters are <u>not</u> under the jurisdictions of any municipal governments;

6) estuarine waters are under both local and state control;

7) the Coastal Zone Management Act calls for state control over matters of state concern, but recommends resolution of land and water use conflicts of local importance at the local level.

The second set of assumptions is concerned with the subject matter of a regulatory statute:

1) the closer a use is to coastal waters the greater the state's concern over it;

2) the larger the magnitude of a use, the greater the state's concern.

From these points sprung the concept expressed below, that there be several geographic areas within which differing degrees of control would be exercised by the state:

1) a primary zone where almost any land or water use could have a direct and significant impact on coastal waters;

2) a secondary zone where many uses could have a direct and significant impact on coastal water quality;

3) a tertiary zone where only a few large uses or use changes, would have a direct and significant impact on coastal waters.

The limits of the coastal, Piscataqua and the Pow Wow, Little and Spickett River watersheds is posited as the largest area within which a use change would have a direct and significant impact on coastal waters. It is here called the tertiary zone.

Municipalities with tidal water frontage were posited as secondary zone.

A primary zone was posited which would include a) all areas over which there is no comprehensive land and/or water use policy exercised by anyone - i.e. offshore waters, and estuarine waters, and b) all areas which have a direct and significant impact on coastal zone management plan, particularly areas where there are fragile ecosystems and their upland edges, and industrial port, docking and navigation areas.

(It was strongly suggested by several local officials that the Primary Zone, where state standards, or regulations, or supervision would be most encompassing should be limited to the area below mean high water since that is the only area not currently subject to any comprehensive use controls since local zoning can, and in some municipalities does, effectively control amost every land use that a coastal zone management plan could hope for. In practice, however, most coastal municipal-

ities do not exercise their full complement of powers, particularly when protection of critical natural areas or developments of more than local concern are involved.)

The process of defining the areal extent of the primary zone:

The initial understanding of which land based ecosystems are peculiar to the coast, and also fragile, produced the following list:

A) beaches

B) sand dunes

C) salt marshes

D) tide flats

E) rocky shores

F) the banks of salt water ways and marshes

These were mapped.

It was then posited than an area landward of these ecosystems probably ought to be used carefully in order to limit likely intrusions into the fragile ecosystems by side effects of various activities on dry land.

Physical considerations made in determining that the landward extent of the area were:

a) the distance polluted effluent from septic tank and tile field systems is likely to travel in very well drained sand and gravel soils (75 feet or more is not uncommon).

b) the elevation to which 1) hurricane purshed sea water and wave action can reach (wave action against rocky shores or seawalls can reach 50'-60' above MSL), 2) rain and hurricane induced flooding has reached or is likely to reach in the marshes, (approximately 10' above MSL).

c) the distance which soil erroded from upland areas, and moved by storm water, will travel through a natural vegetated cover before cleansing itself (sediments such as sand particles drop out in a 15'-20' grassed strip - oils and other distilates of petroleum may stay in suspension for much greater distances.)

d) the distance that a 2½ story building (typical of the non-commercial/

industrial portion of the seacoast) is clearly visable from the critical areas if intervening vegetation is left in place (50-100 feet).

e) the distance inland, port and docking facilities are likely to extend, (1000 feet).

Political Considerations Used In Determining the Landward Extent of the Area Were:

Standards used previously by the legislature in determining a distance for regulation to protect waterways in somewhat similar circumstances were reviewed. 1000 feet from waters edge was the jurisdiction of the Water Supply and Pollution Control Commission under RSA 149e as orginally passed, (regulation of subsurface septic system).

Conclusions

Finally, given all of these factors, it was determined by an exercise of judgement that 1000 feet horizontally or from the landward edge of saltwater or saltmarsh, or the 20 foot contour, whichever was further inland, was the best approximation of an area within which most activities would need to be regulated. More than 2000 feet horizontally was clearly excessive and less than 500 feet was too little, less than 10 feet above MSL was clearly too little and 40 feet above MSL was clearly too much. The resulting numbers fell in the reasonable range.

There are a host of zoning decisions which state the principle that, when the exact location of a boundary is fairly debateable, within certain limits, that since the "line must be drawn somewhere," it need not be absolute defensable to the last foot. Upon this principle rests the use of the approximation.)

The secondary zone was defined as all those municipalities having frontage on tidal waters (with some minor exceptions, the landward extend of salt water and tidal water is identical within a few hundred feet at most due to the presence of mill dams at the head of tidal water on all major rivers). Municipal boundaries were suggested since municipalities are the level of government at which the overwhelming

number of basic land use decisions are now made.

A list of geographic areas where the coastal zone management system would come to play, and a list of uses that will call the system into play, was posited as a part of this boundary determining process.

For example: almost any use of the beaches, or barrier dunes or marshes, would probably have a direct and significant effect on coastal waters. Any industrial or commercial use on dry land adjacent to coastal waters that included a paved parking area from which the storm water runoff drained directly into coastal waters would have a direct - and depending upon its size, and the various other factors - perhaps a significant impact on coastal waters. Similarly septic tank installations, road building, and other various kinds of construction activities, on dry land, could have direct and significant impacts if located on parcels of land abutting marshes or salt waters.

On the other hand, activities at the scale of single family houses, or even mixed residential and commercial development typical of downtown Portsmouth, located on sewer lines on relatively "high" ground (20' above MSL), and not on the ocean front, has little direct or significant impact on coastal waters, if problems caused by storm drainage and domestic sewage are take care of.

But, large industrial complexes which discharge large quantities of pollutants, or require large fresh water divisions, can be located many miles inland and still directly and significantly affect coastal waters.

Legislative Action

During the 1975 session of the New Hampshire General Court the House Committee on Agriculture and Environment with the assistance of regional planning commission personnel, state planning personnel, and legislative services personnel ("legislative services" provides legal drafting service to the state's legislators) proposed a definition of a coastal zone. Since most land use decisions are now made by municipalities, and since legislative and state administrative districts follow municipal boundaries, the legislative committee proposed a boundary which followed

municipal and legislative districts approximating the boundaries suggested above. The coastal zone was therefore described as follows:

"2 Coastal Zone. The general court establishes the following areas as the coastal zone. All that land and water within the area deliniated by the easterly limits of the state jurisdiction in the Atlantic Ocean; the boundary with Massachusetts beginning at Seabrook and ending at the eastern boundary of Atkinson; the western boundary of Maine beginning at Portsmouth and ending at the norther boundary of Wakefield; and a line commencing at the western juncture of Plaistow and the Massachusetts boundary following the line of the western and southern boundaries of the towns of Plaistow, Kingston, Danville, Sandown, Chester, Candia, Deerfield, Northwood, Strafford, Farmington, Milton, Middleton and Brookfield; and ending at the northern boundary of Wakefield at the Maine boundary line." House Bill 362 as passed by the New Hampshire House of Representatives. (The bill did not pass the New Hampshire Senate.)

1. COASTAL ZONE MANAGEMENT AS DEFINED BY OTHER STATES

Alabama

The Coastal Areas Development Act defines the coastal area as "the coastal waters and adjacent shorelands strongly influenced by each and in proximity to the shorelines of Alabama, and includes transitional and intertidal areas, salt marshes, wetlands and beaches. The area extends seward to the outer limit of the United States territorial sea and extends inland from the shoreline only to the extent necessary to control shorelines, the uses of which have a direct and significant impact on coastal waters." Coastal waters include sounds, bays, lagoons, bayous, ponds and estuaries.

For planning purposes, the Coastal Areas Board has divided the coastal area into a Primary, Secondary and Tertiary zone. The Coastal Areas Board will have broad management authority over the Primary Zone, which includes all lands at or below 10 feet above mean sea level and all submerged lands seaward to the territorial limit.

In the Secondary Zone, the Board will have authority over "activities significantly affecting the Primary Zone." This zone will include the area between the inland boundary of the Primary Zone and 50 feet above mean sea level.

In the Tertiary Zone, the Board will act in an advisory capacity to local and county governments and the Regional Planning Commission, and cooperate in various planning and implementation studies. The Tertiary Zone extends from the inland boudary of the Secondary Zone to 100 feet above mean sea level.

Alaska

A broad coastal zone area has been defined for intial planning purposes with

the seaward boundary corresponding to the three-mile territorial limit and the shoreward boundary approximating the upper limit of the coastal zone biome or ten miles from mean high water, whichever is greater. The boundaries will vary in estuarine areas to accommodate extensive portions of the river drainage basins of the estuaries.

California

Section 27100 of the California Coastal Zone Conservation Act of 1972 defines the boundaries of the coastal zone as extending seaward to the outer limit of State jurisdiction and extending inland to the highest elevation of the neareast coastal mountain range, except that in Los Angeles, Orange, and San Diego Counties, the inland boundary is the highest elevation of the nearest coastal mountain range on five miles from mean high tide, whichever is a shorter distance.

Michigan

The State is divided into 14 designated planning regions, each with a regional planning commission or planning and development commission. Ten of the fourteen regions include shoreland areas and will participate in formulation of the coastal zone management program. As a rule, the planning area will include a zone extending about one-half mile inland from the shoreline of each region.

Mississippi

A refined definition of the c oastal zone boundary is an early task in the development of Mississippi's comprehensive coastal zone management plan. However, a tentative boundary for planning purposes has been deliniated employing the concept of primary and secondary zones.

Tentatively, the primary zone will include lands inland one mile from mean high tide, or the limit of the critical hurricane exposure zone.

The secondary zone, where the MMRC will assume the advisory rather than a management role, includes all lands extending from the inland limits of the primary zone to the landward boundaries of Hancock, Harrison, and Jackson Counties.

Oregon

The coastal zone of Oregon is defined in enabling legislation as extending from the crest of the Coast Range on the east to the State's territorial jurisdiction on the west (seaward). This zone is subdivided by counties into four districts, in each of which has been established a coordinating committee.

Virgin Islands

The boundaries of the coastal zone are defined to include the land area and surrounding waters of the offshore islands and cays, all privately owned land within a national park boundary below an elevation of 200 feet, the entire water areas surrounding the main island from mean high water to the established three-mile limit, and the land areas of the main islands which extend inland from mean high tide to an elevation of 200 feet, except where land is relatively flat the boundary will extend 800 feet inland.

Washington

The landward area of Washington's coastal zone has been deliniated through the Shoreline Management Act. The area included in that within 200 feet (measured on a horizontal plane) of the mean high tide line but including all marshes, bogs, swamps, estuaries, floodplains and associated wetlands and streams of 20 cubic

feet per second or more. One task to be accomplished during the year devoted to program development will be to reexamine the existing designation for adequacy.

Wisconsin

The planning area is composed of the 15 counties adjoining Lakes Michigan and Superior. In addition to providing a consistent political boundary, this relatively deep planning area will provide sufficient area to analyze the impact of land uses on the coastal waters and, if necessary, provide alternative management zones, particularly in those cases where a standard land setback zone from the water will not be adequate to encompass the boundaries of certain critical resource areas.

The shoreland management boundaries provide a feasible management area, including those unincorporated lands within 1,000 feet of the ordinary high watermark of navigable lakes, including the Great Lakes. Further, Section 87.30 of the Wisconsin Statutes requires that counties, cities and villages regulate the floodplains of streams including those tributary to the Great Lakes. Jointly, these two statutes provide a possible zone where State and local authority may be imposed on land use. However, experience with these statutes and the proposed management needs in the coastal zone indicate potential modification of this zone.

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[1] From: State Coastal Zone Management Activities 1974, U.S. Department of Commerce, October 1974.

[2] Coastal Zone Management Conference, Annapolis, Maryland, May 1973
Coastal Zone Management Conference, Charleton, South Carolina, March 1974
Meeting of coastal New England states sponsored by various organizations at Portland, Maine, Portsmouth, New Hampshire and Boston, Massachusetts.

W. P.

N.H. Coastal Resources
Management Program
First Year Report
Attachment A - 2
07158

MAY 18 1976

INVENTORY OF STATE AND FEDERAL PROPERTY IN THE COASTAL ZONE

Prepared by
Strafford Rockingham Regional Council

The preparation of this report was supported in part by a grant provided by the Coastal Zone Management Act of 1972, administered by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

Introduction

In accordance with the contract between the Strafford Rockingham Regional Council and the New Hampshire Office of Comprehensive Planning, dated May 25, 1975, this is a listing of all state and federal properties in the primary and secondary coastal zones as defined. State highways and a description of easements connected with them have been included. Federal properties in the tertiary zone have been listed.

Federal and State Properties

Tax records and, where available, tax maps, of all towns located in the primary and secondary zones were checked. Listed state and federal properties were recorded and the information was placed on the accompanying maps where possible. This information was not complete, however, and further research was necessary in order to complete the inventory.

State properties were further inventoried by checking the records of various state agencies, such as the Department of Public Works and Highways and the New Hampshire Department of Fish and Game. Their records contain a brief description of the parcel, but usually did not provide exact boundaries. This information was placed on the accompanying maps where possible. Copies of the pertainant records are included in this report. Further details are available at individual state agencies.

A further survey of federal property was conducted, by contacting individual federal agencies known to be active in the coastal zone (including the tertiary zone). Department of Air Force, Department of the Army, Department of the Navy, Department of Agriculture and the United States Postal Service were contacted. The General Services Administration, which is responsible for the control of much federal property, was contacted as well. A number of towns in the tertiary zone were also contacted. The resulting information was placed on the accompanying maps.

The properties located by these efforts are included in the tables and data sheets contained in this report. Information is also graphically displayed where possible on the 1:24,000 scale maps which accompany the report. Two tables have been included in Table 1 - State and Federal Properties -- Primary and Secondary Coastal Zones and Table 2 - Federal Property in the Tertiary Zone.

Table 1 lists, by town, state and federal property in the primary and secondary zones. Included are the owner (federal government, state, and where available, state agency, such as New Hampshire Department of Fish and Game); local tax map and parcel numbers; acreage; land and improvement (i.e. buildings and structures) values (where available); and an indication of whether or tracing of the tax map was made (tracings are in Strafford Rockingham Regional Council files).

Table 2 provides a listing of federal properties in the tertiary zone. Indicated are ownership and lot size. Federal property in this zone is in small parcels, primarily as post offices. These properties are not thought to be significant to the development of the New Hampshire Coastal Zone Management program.

Following Table 2 are the source data sheets obtained from individual state agencies consulted in developing the inventory. Data sheets are arranged alphabetically by town in which the property is located.

Highway Rights-of-Way and Easement Descriptions - Table 3

This portion of the effort is composed of an inventory of highway rights-of-way and power line rights-of-way when adjacent to a highway. These right-of-way descriptions were obtained directly from the New Hampshire Department of Public Works and Highways. Unless otherwise noted, all rights-of-way belong to that agency.

Prior to outlining the methodology used to identify right-of-ways, a few terms need to be defined:

Right-of-way (ROW) is defined as that width of land over which a public utility is built. For highways and powerlines, the ROW is usually measured equally on either side of the utility, with the road centerline or center power line being the divider.

State (Sta.) is the term applied to points marked along a highway at intervals of one hundred feet; facilitating the description of ROW's which vary from station to station. The numbering system would usually assign the number 0+00.00 to the first station and 5+50.00 to the point 550 further down the road. Unfortunately, stations are not always numbered consecutively along the same highway because subsequent road improvements often result in a new numbering system. A mathematical equation is used to convert a station number from an old system to one in the new system. For example, old station 0+01.55 might become new

station 10+01.55 when the equation is applied. Changes in station numbering as a result of the equation system are indicated in the description of highway right-of-ways.

The methodology used to determine ROW's involves locating blueprints and plans of specific highways and measuring the ROW's from station to station. This process is complicated by the fact that the highway department utilizes two different filing systems for their plans. An "old system" is used when referencing roads which have not undergone major improvements in the past 30 or 40 years. The "new system" encompasses any road or portion of a road which has been more recently improved. A more complete description of these two systems follows:

Old System. This system, initiated as part of the WPA program, uses U.S.G.S. topographical maps to locate highway projects. The U.S.G.S. system divides the state into numbered, uniform grids which can be found superimposed on an index map of the state included in the highway department records. This larger map is used to identify a specific geographical area and its associated grid number. It is then possible to refer to a more detailed map of the specific grid, in order to determine ROW's. Each highway included in the old system is identified by two numbers, i.e., 10-58. The first number refers to the specific project and the latter to the grid number. Once the project number of a particular highway is known, it is then possible to obtain the plans for that project and measure the ROW's.

New System. This system consists of maps arranged by county. On each map, areas of highway construction are delineated and numerically labeled. These numbers identify the projects once they have been located on the map. On the page facing each map, these numbers are listed, followed by the job number, date of the project, and the number of the highway plan that contains a detailed description of the ROW's. On occasion, a brief verbal description and width of the ROW are also included.

Information obtained from the Department of Public Works and Highways has been presented in Addendum Two -- Highway Right of Ways. Information is arranged alphabetically by towns in which the property is located. Each listing indicates whether the old or new systems (see above) has been used for classification. In the case of the new system, ID numbers, job numbers, descriptions and the plan number containing a more detailed listing of right of way are given. Old

system citations are limited to a road number, grid number, and width of right of way, in rods. Rights of way associated with the I-95 widening project are listed separately at the end of Addendum Two. More detailed descriptions of all listings can be obtained through the Department of Public Works and Highways using the given plan numbers or road and grid numbers as appropriate.

The highways researched have been presented on maps accompanying this report. Highway on the maps have been coded to the numerical ID numbers listed for them in the tables presented in Addendum Two. They have also been color coded on the maps according to the following scheme:

Blue - State Primary System (Class I)
Orange - State Secondary System (Class II)
Yellow - State Recreation Roads (Class III)
Green - Maintained town road (Class V)
Brown - Non-maintained town road (Class VI)
Red - Forest development highway (Class VII)

It should be noted that the state has recently completed classification of all roads to comply with a new federal system. Full conversion has not been completed, however, and coding has been done to comply with the old system. For future reference, the new system includes the following classifications:

(a) Freeways: Provide regional and metropolitan continuity. Limited access; no grade crossing, no traffic stops.

(b) Expressways: Provide metropolitan and city continuity and unity. Limited access, some channelized grade crossings and signals at major intersections. Parking prohibited.

(c) Major Roads: Provide unity throughout contiguous urban area. Usually form boundaries of neighborhoods. Minor access control; channelized intersections, parking generally prohibited.

(d) Secondary Roads (Minor Arterials): Main feeder streets. Signals where needed; stop signs on side streets. Occasionally form boundaries for neighborhoods.

(e) Collector Streets: Main interior streets. Stop signs on side streets.

(f) Minor Streets: Local streets. Nonconducive to through traffic.

(g) Loop: Same as minor streets.

(h) Cul-de-sac: Street open only at one end with provision for a practical turn-around at the other.

(i) Alleys: Used primarily for vehicular service access to the back or the side of properties abutting a street.

Table 1 - State and Federal Properties -- Primary and Secondary Zones

Table 2 - Federal Property in the Tertiary Zone

Inventory of State Property -- Individual Data Sheets

Table 3 - Highway Rights-of-Way and Easement Descriptions

Town/Owner	Map Number	Parcel Number	Acres	Land Value in Dollars	Improvement Value in Dollars	Map Traced
Exeter	08-16	17	2	---	-----	Yes
State of N.H.	(See Record of Highway Property for additional listing)					---
Greenland						
Fish & Game	No tax maps		Approx 50	---	-----	Approximated
Fish & Game	"	"	1 acre	---	-----	"
Highway Dept.	"	"				Refer to record of highway property
Hampton						Yes
State	006	002	2.5A	1730	-----	
Fish & Game	037A	019	2A	100	-----	Not mapped
State	039	004		4360	-----	Yes
Highway Dept.	039A	020	4	100	-----	Yes
Fish & Game	096	031	3	300	-----	Yes
State	263	008	12	4100	-----	Yes
State	263	010	6.3	3000	-----	Yes
Highway	263	013		700		Yes
Highway	263	614		2000	5100	Yes
State	300	006	1.7	160		Yes
Highway	310	009	1.1	80		Too small
Highway	320	001	53.8	3810		Yes
Highway	320	002	11.3	1430		Yes
Highway	320	011	2.6	1460		Yes
State	370	624A	20.3	5300		Yes
State	370	030	4.2	13,700		Yes
Highway	380	005	1.98	6710	16,810	Yes
Highway	380	006	1.15	4000	13,300	Yes
Highway	410	001	5.7	5300		Yes
Fish & Game	420	014	10.6	2120		Yes
Fish & Game	420	018		5000		Yes
State	998	057	4	120		Not mapped
Fish & Game	998	070	172marsh land	60		Not mapped
State Park	Not mapped w/ tax records		Approx 50			
Hampton Falls	None					
New Castle						
State	Fort William & Mary		Not mapped			Approximated
Federal Gov't.	Fort Stark		Not mapped			Approximated
Federal Gov't.	Coast Guard Station		Not mapped (Approx. 11 acres)			Approximated
Newfields						
Highway	6	34	21A			Yes
Newington						
Highway	State garage					Yes
State	7	--	Approx 3			Yes
State	7	--	Approx 6			Yes
Federal Gov't.	Pease AFB		Not mapped			

TABLE 1.- State and Federal Properties
Primary and Secondary Coastal Zones

Town/Owner	Map Number	Parcel Number	Acres	Land Value in Dollars	Improvement Value in Dollars	Map Traced
North Hampton						
State	No numbers given		16.05A			Yes
State	"	"	10.56A			Yes
State	"	"	8.4A			Yes
State	"	"	5A			Yes
Portsmouth						
Port Authority	014	068	43,840 sq. ft.			Yes
P.A.	014	069	4,025 sq. ft.			Yes
State	068	294	3,820 sq. ft.			Yes
State	070	002	3.25A			Yes
P.A.	075	003	32A			Yes
Highway	075	010	3,884 sq. ft.			Yes
Highway	075	011	3,171 sq. ft.			Yes
Highway	075	012	4,200 sq. ft.			Yes
P.A.	075	015	2.3A			Yes
P.A.	075	016	41,300 sq. ft.			Yes
Highway	075	017	11,318 sq. ft.			Yes
Highway	082	060				Yes
Highway	091	001	13,180 sq. ft.			Yes
Highway	091	005	7,340 sq. ft.			Yes
Highway	091	029	6,568 sq. ft.			Yes
Highway	091	030	7,340 sq ft			Yes
State Armory	112	008	5.4A			Yes
State	209	002	8.8A			Yes
State	209	008	85A			Yes
State	209	009	8.78A			Yes
State	209	014	.5A			Yes
State	209	018	3.7A			Yes
State	211	031	3.2A			Yes
State	212	003	16.5A			Yes
State	212	004	14.6A			Yes
State	212	016	.95A			Yes
State	213	008	16.2A			Yes
State	213	009	16.1A			Yes
State	213	019	.97A			Yes
State	213	020	14.9A			Yes
State	213	021	38.3A			Yes
Vocational School	225	001	2.97A			Yes
	225	014	2.12A			Yes
	230	001	18.8A			Yes
	230	025	5.9A			Yes

Table 1 - Continued

Town/Owner	Map Number	Parcel Number	Acres	Land Value in Dollars	Improvement Value in Dollars	Map Traced
Portsmouth (Continued)						
Federal Gov't.	213	13	.28A			Yes
	84	124				Too small
	94	014	5000 sq. ft.			Yes
	112	54	Fed. Bldg.			Yes
	114	011	1A			Yes
	209	2	.6A			Yes
	209	3	2.7A			Yes
	209	4	49.5A			Yes
	209	12	65A			Yes
	209	17	11.7A			Yes
Rye						
State	Zoning Map		137	Odiorne's State Park		Yes
State	15	--	5.25	Ragged Neck State Park		Yes
State	18	--	Too small	Jeness Beach		Yes
State	8	--	Too small	Wallis Sands		Yes
Federal Gov't.	5	128	8424 sq. ft.			Yes
Federal Gov't.	5	115	9375 sq. ft.			Yes
Federal Gov't.	5	116	10,368 sq. ft.			Yes
Highway	Patrol Headquarters		7 Acres	East side of Route 1		Refer to record of Highway Property
Federal Gov't.	15	68	42,000 sq. ft.			
Federal Gov't.	White Island Light Station			(Not mapped, approx. 1 acre)		
Seabrook	None					Yes
Stratham	None					Yes

Table 1 - Continued

Town/Owner	Map Number	Parcel Number	Acres	Land Value in Dollars	Improvement Value in Dollars	Map traced
Dover						
[redacted]ighway Dept.	8	25.27	n/a			yes
	8	45	n/a			yes
	L	51	17.8			yes
	J	28	n/a			yes
	M	46	n/a			yes
	M	41	n/a			yes
	M	32	n/a			yes
	M	25	n/a			yes
	K	35A	n/a			yes
	16	31	n/a			yes
	25	34	n/a			yes
	A	17	n/a			yes
	A	34	6.0			yes
	D	9A	n/a			yes
	D	7	n/a			yes
	D	5A	n/a			yes
	D	2C	n/a			yes
Durham						
U.N.H.	Property Maps					
	38		164.9			
	24		72.7			
	32		23.0			
	27		280.9			
	26		32.7			
	48		5.84			
	33		8.9			
[redacted]	34		35.3			
	35		14.9			
	25		21.3			
	49		17.8			
	2,25,28,45,47		11.1			
	10		33.4			
	9		23.7			
	20		31.3			
	11,29		106.6			
	23		125.4			
	36		42.8			
	15		28.9approx.			
	17		6.3			
	1 (west of tracks)		116.9			
	1 (between tracks and Mill Road)		4.7 .25			
	*Pumping station		15.0			
	*No. of old Beech Hill Road Land East of tracks					
Adams Point						
Fish and Game			80			
Madbury						
[redacted]ghway Dept.			11.25			Yes

Table 2

FEDERAL PROPERTY IN THE TERTIARY ZONE

Rochester

U.S. Army Reserve Training Center Rochester Hill Road Owner: Department of the Army	approx. 3A
U.S. Post Office Main and Bridge Street Owner: United States Postal Service	16,900 $feet^2$

Somersworth

U.S. Post Office Elm Street Owner: United States Postal Service	17,131 $feet^2$

INVENTORY OF STATE PROPERTY
INDIVIDUAL DATA SHEETS

(Listed alphabetically by town)

DOVER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported WAYSIDE AREA

Location: Town DOVER - HILTON PARK County STRAFFORD
Describe Bounds: (NORTH)

A certain parcel of land situated in Dover in the County of Strafford and said State, bounded and described as follows: Beginning on the old highway leading to the former Dover Point Bridge and at other land of the Boston & Maine Railroad at a point South 65° 46' West from Station 230+80 on the center line of the location of the Dover Branch of the Boston & Maine Railroad; thence running North 65° 46' East by said railroad land or location, crossing said center line of location at the station above named, ninety-six and nine tenths (96.9) feet to land now or formerly of J. P. Hanson; thence turning and running South 35° 40' East by said last named land three hundred twenty-five and six tenths (325.6) feet to other land or location of said Railroad; thence turning and running South 54° 20' West by said last named land or location ninety-four and five tenths (94.5) feet to said old highway; thence turning and running North 35° 45' West by said old highway three hundred forty-four and eight tenths (344.8') feet to the point of beginning, be all of said measurements more or less.

Record of Title: Deed Reference 497/240

Registry STRAFFORD

How Acquired DEED

Improvements Since Acquisition AREA FACILITIES

Extent of Property (Number Acres, Buildings, Etc.) 31,770 sq. ft.

Present Use WAYSIDE AREA

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 646/136

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 6.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4547 - 1482

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 647/269

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 10.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1483

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 646/300

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 20.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1486

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 645/353

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 2.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1491

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 645/355

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 12.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1492

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD

Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 648/34

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE -

Extent of Property (Number Acres, Buildings, Etc.) 4.5 ACRES BRUSH LAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported WAYSIDE AREA

Location: Town DOVER - HILTON PARK County STRAFFORD
Describe Bounds: (NORTH)

The real estate, situate at Dover Point, so-called, in Dover County of Strafford, and State of New Hampshire and known generally as "The Rookery" and bounded and described as follows: Northerly by land now or formerly of Emily Pinkham and land now or formerly of Herbert Dame, easterly by the old highway leading from Portsmouth to Dover, southeasterly by said highway and land now or formerly of the Boston & Maine Railroad, southerly, southwesterly and westerly by the Piscataqua River, excepting therefrom the land heretofore conveyed by Fanny E. King to the State of New Hampshire for highway purposes by deed dated 12-1-33 recorded Strafford County Registry, Vol. 457, Page 143.

Record of Title: Deed Reference 484/62

Registry STRAFFORD

How Acquired DEED

Improvements Since Acquisition AREA FACILITIES

Extent of Property (Number Acres, Buildings, Etc.)

Present Use WAYSIDE AREA

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported WAYSIDE AREA

Location: Town DOVER - HILTON PARK County STRAFFORD

Describe Bounds: (NORTH)

Beginning at a point on the northerly side of Cedar Point in the City of Dover at the mean high water mark of the Ballamy River, said point being the northeasterly corner of land now or formerly of Fred P. Meader; and running thence S. 11° 30' W. with the easterly line of said Meader's land and across the highway which approaches the Colonel Alexander Scammell Bridge, a distance of about 277 feet to an angle in said Meader's easterly line; thence S. 3° 15' W. about 240 feet to the mean high water mark of Little Bay; thence running general easterly, northerly, and northwesterly following the mean high water mark of Little Bay to the mouth of the Bellamy River a distance of approximately 960 feet to the point of beginning. Including in addition to the above all rights to land uncovered by the ebb of the tide. Said area contains 2.12 acres exclusive of the highway previously mentioned.

Record of Title: Deed Reference 494/164

Registry STRAFFORD

How Acquired DEED

Improvements Since Acquisition AREA FACILITIES

Extent of Property (Number Acres, Buildings, Etc.) 2.12 ACRES

Present Use WAYSIDE AREA

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported WAYSIDE AREA

Location: Town DOVER - HILTON PARK County STRAFFORD

Describe Bounds: (NORTH)

Two certain pieces or parcels of land situated in Dover in the County of Strafford and State of New Hampshire, bounded and described as follows: FIRST: Beginning on the highway leading across the former location of the Portsmouth and Dover Branch of the Boston & Maine Railroad at Ford's Crossing at land now or formerly of Azuban Card, et al at a point thirty-six (36') feet easterly from and measured radially to the center line of said location; thence running southeasterly on a line concentric with and thirty-six (36') feet easterly from said center line, having a radius of two thousand eight hundred twenty-nine (2,829') feet, about one thousand six (1,006') feet to a point thirty-six (36') feet northeasterly measured radially to said center line of location at Station 249+37; thence turning and running South 58° 20' West across said location eighty-three (83') feet to other land now or formerly of said Card. et al; thence turning and running northwesterly by said last named land on a curve to the right having a radius of two thousand nine hundred twelve (2,912') feet; about eight hundred feet (800'); thence turning and running southwesterly about one hundred (100') feet; thence turning and running North 64° 40' West by land now or formerly of Thomas Card about ninety (90') feet to said highway; thence turning and running northeasterly by said highway three hundred thirty-two (cont'd)

Record of Title: Deed Reference 975/395

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition AREA FACILITIES

Extent of Property (Number Acres, Buildings, Etc.) 2.13 ACRES

Present Use WAYSIDE AREA

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported

Location: Town DOVER-HILTON PARK County

Describe Bounds: (NORTH)

(332') feet to the point of beginning, be all of said measurements, more or less.

Record of Title: Deed Reference

Registry

How Acquired

Improvements Since Acquisition

Extent of Property (Number Acres, Buildings, Etc.)

Present Use

Signed:

Title:

5 of 11 4924 - 1

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported PATROL HEADQUARTERS

Location: Town DOVER County STRAFFORD

Describe Bounds:

A certain lot of land together with the bldgs. and other structures thereon located in the City of Dover in the County of Strafford and State of New Hampshire, on the highway leading from Dover to Dover Point as now travelled, and lying between said highway and the Dover Point Road as travelled prior to 1934 nearly opposite the junction of the Cushing Road, so-called, bounded and described as follows: Beginning at a concrete bound at the northeasterly corner of land of John E. Davy, said bound being 33.0 feet distant southwesterly from and directly opposite Station 208+10, as shown on a Plan of National Recovery Municipal Project #262 for 1933 in the records of the New Hampshire State Highway Department; thence running S. 44° 40' W. with said Davy's land, a distance of 104.36 feet to a concrete bound on the northeasterly side line of the Dover Point Road as travelled prior to 1934; thence running S. 39° 39' E. along the northeasterly side line of said highway, a distance of 73.0 feet to a concrete bound at the southwesterly corner of land of Rachael C. Brownell; thence running N. 50° 21' E. with the northwesterly line of land of said Brownell and land now or formerly of James H. Varney, a distance of 117.89 feet to a concrete bound in the southwesterly line of the present travelled Dover Point Road; thence turning and running northwesterly curving to the right with the arc of a circle having a radius of 1,179.28 feet, a distance of 84.5 feet to the point begun at. Containing 8,650 sq.ft. more or less.

Record of Title: Deed Reference 483/80

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition MAINTENANCE BUILDING

Extent of Property (Number Acres, Buildings, Etc.) 0.2 ACRE

Present Use PATROL HEADQUARTERS

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported SALT AND EQUIPMENT STORAGE

Location: Town DOVER County STRAFFORD

Describe Bounds:

Two parcels located on Cushing Road, so-called, in the City of Dover, described as follows: #1:- Beginning at a point, marked by a concrete bound on the westerly side of Cushing Road, so-called, in said Voer, at the Southeasterly corner of land now or formerly owned by James W. Cullen; running thence along the westerly side line of Cushing Road, bounded by a fence as it now stands S 6° 07' W 115.11 feet to a point marked by a concrete bound; thence continuing on the said westerly side line of Cushing Road S. 11° 23' W. 71.68 feet to a point marked by a concrete bound, thence turning and running N. 86° 53' W. 396.40 feet across land of said Glidden to a point, marked by a concrete bound; thence running N. 24° 44' W. 121.20 feet along the fence and westerly R. O. W. line of the Boston & Maine Railroad (now abandoned) to a point, marked by a concrete bound; thence running N. 83° 35' E. 475.92 feet along the fence as it now stands and being the Southerly side line of land now or formerly owned by James W. Cullen to the point of beginning. Containing 1.485 acres. #2:- A certain tract of land situated in Dover, NH and described as follows: Beginning at a point marked by a concrete bound on the easterly side of Cushing Road, so-called, in said Dover, at the southwesterly corner of land now or formerly owned by Norman J. Lord; running thence S. 45° 54' E. 377.00 feet along the boundary line between said Lord and Norman H. and Maria Glidden to a point marked by (CONT'D)

Record of Title: Deed Reference 555/437

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition SALT SHED

Extent of Property (Number Acres, Buildings, Etc.) 3.86 ACRES

Present Use SALT AND EQUIPMENT STORAGE

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported SALT AND EQUIPMENT STORAGE

Location: Town DOVER County STRAFFORD
Describe Bounds:

a concrete bound, thence running S 10° - 20' W. 309.25 feet along the fence as it now stands by land now or formerly owned by W. A. Crockett to a point marked by a concrete bound; thence running N. 49° - 10' W. 390.80 feet along the boundary line of said Glidden and land now or formerly owned by William Sunderland to a point marked by a concrete bound; thence running N. 14° 28' E. 321.00 feet along the easterly side of said Cushing Road to the point of beginning. Containing 2.385 acres.

Record of Title: Deed Reference 555/437

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition

Extent of Property (Number Acres, Buildings, Etc.) 3.86 ACRES

Present Use SALT AND EQUIPMENT STORAGE

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD

Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 640/180

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.4 ACRE HOUSE LOT

Present Use NONE

Signed:

Title: COMMISSIONER

4947 - 121

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 639/388

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.23 ACRE WOODLAND

Present Use NONE

Signed:

Title: COMMISSIONER

4947 - 1095

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 634/268

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 1.5 ACRES WOODLAND

Present Use NONE

Signed:

Title: COMMISSIONER

4947 - 1265

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 637/356

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 3.0 ACRES BRUSHLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1498

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 643/178

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 6.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4947 - 1479 File No.

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town DOVER County STRAFFORD
Describe Bounds:

West Side Spaulding Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 646/444

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 30.0 ACRES WOODLAND

Present Use NONE - TRACT OF LAND ACQUIRED AS IT WAS CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

Dover Pt.
(P.W. EN. - Eq)

May 12, 1971

His Excellency Walter Peterson
and Members of the Honorable Council
State House
Concord, New Hampshire 03301

Gentlemen:

At the regular monthly meeting of the New Hampshire Council of Resources and Development held on April 16, 1971, it was unanimously voted that the 17.8 acres of land at Dover Point, that is surplus to the needs of the Department of Public Works and Highways, be transferred to the New Hampshire Fish and Game Department for wildlife management purposes. We also have the approval of the Department of Public Works and Highways Commissioner Robert H. Whitaker.

This tract of land was acquired by the State in 1955 as part of the land acquisition for the Spaulding Turnpike. It has not been in use since then. One side of the tract abuts on the Bellamy River where the river enters Great Bay and would provide an access to Great Bay when developed. This, we would plan to do under a Federal Aid project.

It is becoming increasingly difficult for people to reach Great Bay due to the high percentage of posted land. Great Bay and the Bellamy River section are one of the outstanding waterfowl hunting areas in New Hampshire, as well as excellent striped bass and saltwater smelt fishing.

Your approval for the transfer of this land to our Department is respectfully requested, so that the Great Bay area will be more readily available for recreation.

Thank you.

Respectfully submitted,

Bernard W. Corson
Director

BWC:Lsemb
Enclosure
(map)

c.c. R.H. Whitaker
M.L. Greenough

DURHAM

I/WE We, Robert S. Congdon and Jeanette deB. Congdon,

husband and wife, of Durham, in the County of Strafford and State of New Hampshire, for consideration paid, grant to The State of New Hampshire Fish and Game Department, with warranty covenants to the said State of New Hampshire, a strip of land approximately fifty (50) feet wide extending southeasterly from Bay Road in said Durham through land of said grantors to land of Kent and Rollins, more particularly bounded and described as follows:

Beginning at a point on the Easterly side line of Bay Road at a stone wall and land of the Grantor and Philip Sawyer; thence Southeasterly by said stone wall and land of Sawyer fourteen hundred (1400) feet, more or less, to a point; thence South 50½ degrees East, three hundred (300) feet to a point; thence South 59½ degrees East, fifty (50) feet to a point; thence South 84 degrees East, one hundred (100) feet to a point; thence South 87 degrees East, sixty-five (65) feet, more or less, to land of Kent and Rollins; thence Southwesterly by land of Kent, Rollins, and the Grantor, fifty (50) feet, more or less, to a point; thence Northwesterly nineteen hundred and fifteen (1915) feet, more or less, parallel to the first mentioned bounds, to the Easterly side line of Bay Road; thence Northeasterly by Bay Road, fifty (50) feet, more or less, to the point of beginning.

Reserving to the Grantors, their heirs and assigns, all the rights the Grantors now have in the line stonewall and line trees abutting land of Sawyer. Also reserving all timber or cordwood cut from the said strip of land. Also further reserving a right-of-way over the herein described property for the Grantors, their heirs and assigns; Ralph E. Kent, his heirs and assigns, and the heirs and assigns of the Sherwood Rollins estate, from Bay Road to their respective properties.

Being part of the premises asdeeded to the Grantors by Sherwood Rollins December 16, 1951, Strafford County Records, Book 599, Page 245.

It is a condition of this conveyance that if the proposed new access road, including a connection to the Grantor's driveway, is not constructed within a period of five years from the date of this conveyance, then the right title and interest herein conveyed shall revert to the Grantors, his heirs, legatees or assigns, and this conveyance shall become null and void.

And Durham Trust Company, a corporation duly organized by law and having a principal place of business in said Durham, by Harry Allen, its treasurer duly authorized, for consideration paid, hereby releases the above described property from the lien effect of a certain mortgage deed to it dated September 25, 1958, and recorded in the Strafford County Registry of Deeds, book 693, Page 425.

DURHAM TRUST COMPANY

By: Harry Allen
Treasurer

KNOW ALL MEN BY THESE PRESENTS, THAT I, ANALESA M. ADAMS, A WIDOW, OF DURHAM, COUNTY OF STRAFFORD AND STATE OF NEW HAMPSHIRE, FOR CONSIDERATION PAID, GRANT TO THE STATE OF NEW HAMPSHIRE, FOR THE FISH AND GAME DEPARTMENT, WITH WARRANTY COVENANTS,

A CERTAIN TRACT OR PARCEL OF LAND, WITH THE BUILDINGS THEREON, SITUATED IN SAID DURHAM AND CONSISTING OF EIGHTY (80) ACRES, MORE OR LESS, BOUNDED AND DESCRIBED AS FOLLOWS:

NORTHERLY BY THE KENT FARM, SO-CALLED; EASTERLY, SOUTHERLY AND WESTERLY BY GREAT BAY, LITTLE BAY AND THE COVES AND CREEKS OF SAID BAYS, AS DESCRIBED IN TWO CERTAIN DEEDS OF JOSEPH M. R. ADAMS TO EDWARD H. ADAMS, DATED DECEMBER 27, 1913, AND RECORDED IN THE STRAFFORD COUNTY REGISTRY OF DEEDS, BOOK 372, PAGE 576, AND BOOK 373, PAGE 127; TOGETHER WITH ALL OF MY RIGHTS OF ACCESS TO SAID PREMISES FROM THE DURHAM POINT ROAD.

MEANING AND INTENDING TO CONVEY HEREBY THE ADAMS FARM LOCATED ON ADAMS POINT, SO-CALLED, IN SAID DURHAM, WHICH I INHERITED UNDER THE WILL OF MY LATE HUSBAND, EDWARD C. ADAMS (SEE STRAFFORD COUNTY PROBATE FILE #A9255).

RESERVING TO THE GRANTOR, HER HEIRS AND ASSIGNS, THE FAMILY TOMB AND THE LAND ON WHICH IT STANDS, LOCATED APPROXIMATELY TWO HUNDRED (200) YARDS IN A WESTERLY DIRECTION FROM THE HOMESTEAD, AND ACCESS THERETO, AS RESERVED IN THE DEED OF ERASTUS L. AND MARY A. SENTER TO JOSEPH M. R. ADAMS, UNDATED, RECORDED IN THE STRAFFORD COUNTY REGISTRY OF DEEDS, BOOK 252, PAGE 158.

THE GRANTOR FURTHER RESERVES THE RIGHT TO OCCUPY THE HOMESTEAD AND BARNS, OR A PORTION THEREOF, FOR AND DURING HER NATURAL LIFE OR UNTIL THE EXPIRATION OF TWENTY (20) YEARS FROM THE DATE OF THIS DEED, WHICHEVER FIRST OCCURS, WHICH RIGHT OF OCCUPANCY SHALL INCLUDE THE RIGHT OF ACCESS TO SAID PREMISES FROM THE DURHAM POINT ROAD ON THE PRESENTLY EXISTING OR A COMPARABLE ROADWAY, ACCESS TO AND FROM AND THE USE OF THE SPRING LOCATED APPROXIMATELY ONE HUNDRED (100) YARDS SOUTHWESTERLY OF SAID HOMESTEAD BUILDING AND ACCESS TO AND FROM AND THE USE OF THE WHARVES, BOATHOUSES AND BOATING FACILITIES LOCATED ON SAID PREMISES.

EXETER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town EXETER County ROCKINGHAM
Describe Bounds:

New Route #101-C.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1606/39

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.5 ACRE

Present Use NONE - TRACT OF LAND CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town EXETER County ROCKINGHAM
Describe Bounds:

Route 101-C by-Pass.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1615/28

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 1.1 ACRE

Present Use NONE - TRACT OF LAND CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town EXETER County ROCKINGHAM
Describe Bounds:

3.3 ACRES SOUTH OF ROUTE 101 near SQUAMSCOTT RIVER.

11.9 ACRES SOUTH OF ROUTE 101 - STATION 157+00 to 159+00.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1479/151

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 3.3 ACRES - 11.9 ACRES

Present Use NONE - TRACT OF LAND CUT OFF FROM ALL ACCESS.

Signed:

Title: COMMISSIONER

4917 - 2

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported STORAGE AREA

Location: Town EXETER County ROCKINGHAM

Describe Bounds:

A parcel of land located on Charter Street in the Town of Exeter, County of Rockingham, State of New Hampshire, bounded and described as follows: Beginning at a granite bound in the southeasterly boundary of Charter Street, said bound being corner between land og Grantor and land of the State of New Hampshire; thence running S. 38° E. a distance of 200 feet more or less, along land of said State of New Hampshire to a concrete bound in northwesterly right-of-way line of the Western Division of the Boston & Maine Railroad, which bound is corner between land of the grantor and the said State of New Hampshire; thence turning and running N. 52° E. a distance of 376 ft. more or less along said right-of-way line of said Railroad to a concrete bound, said bound being corner between land of Grantor and land now, or formerly of Exeter Industries, Incorporated; thence turning and running N. 38° W. a distance of 200 feet more or less, along land of said Exeter Industries, Inc. to a concrete bound in a southeasterly boundary of said Charter Street, said bound being corner between land of Grantor and land of said Exeter Industries, Inc.; thence turning and running S. 52° W. a distance of 376 ft. more or less along said Charter St. to the point of beginning. Containing 1.7 acres.

Record of Title: Deed Reference 967/148

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition SAME USED

Extent of Property (Number Acres, Buildings, Etc.) 1.7 ACRES

Present Use STORAGE AREA

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported PATROL HEADQUARTERS

Location: Town EXETER County ROCKINGHAM

Describe Bounds:

A tract of land containing 10 acres situated in Exeter, County of Rockingham and State of New Hampshire as described in deed from the Socony-Vacuum Oil Co., Inc. to the State of New Hampshire recorded in the Rockingham County Registry of Deeds, Lib. 927, Fol. 232 dated March 16, 1937.

Record of Title: Deed Reference 927/232

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition MAINTENANCE BUILDING

Extent of Property (Number Acres, Buildings, Etc.) 10 ACRES

Present Use PATROL HEADQUARTERS

Signed:

Title: COMMISSIONER

GREENLAND

4964 - 1

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported GRAVEL AND SAND PITS

Location: Town GREENLAND County ROCKINGHAM
Describe Bounds:

A parcel of land situated easterly of the Post Road in the Town of Greenland, bounded as follows: Beginning at an iron pin in the easterly side line of said Post Road; thence N. 78° 02' 30" E. a distance of 101.5 feet to an iron pin; thence N. 0° 19' E.a distance of 91.1 feet to an iron pin; thence S. 63° E. 383.41 feet to a fence corner; thence N. 37° 26' 30" E. with a fence line to a fence corner; thence S. 65° 23' 30" E. with a fence line five hundred feet (500') to a stake; thence S. 26° 34' N. 649.5 feet to a stake; thence N. 62° W. 569.6 feet to a stake; thence N. 26° 28' E. 224.0 feet to a stake; thence S. 85° 27' 30" W. 434.7 ft. to a stake in the easterly side line of said Post Road; thence about 16 feet to the point of beginning.

Record of Title: Deed Reference 1323/154

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 8 ACRES

Present Use GRAVEL AND SAND PIT

Signed:

Title: COMMISSIONER

4946 - 422

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town GREENLAND County HILLSBORO

Describe Bounds:

East Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1093/480

Registry HILLSBORO COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.1 ACRE WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT IS TO BE HELD UNTIL THE COMPLETION OF INTERSTATE 95 AT WHICH TIME A DETERMINATION OF ITS NEEDS BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town GREENLAND County HILLSBORO
Describe Bounds:

West Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1101/401

Registry HILLSBORO COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.7 ACRE WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT IS TO BE HELD UNTIL THE COMPLETION OF INTERSTATE 95 AT WHICH TIME A DETERMINATION OF ITS NEEDS BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

4946 - 420

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town GREENLAND County HILLSBORO
Describe Bounds:

East Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1098/161

Registry HILLSBORO COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 5.0 ACRES WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT IS TO BE HELD UNTIL THE COMPLETION OF INTERSTATE 95 AT WHICH TIME A DETERMINATION OF ITS NEEDS BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

4946 - 419

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town GREENLAND County HILLSBORO
Describe Bounds:

East Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1106/227

Registry HILLSBORO COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 5.0 ACRES WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT IS TO BE HELD UNTIL THE COMPLETION OF INTERSTATE 95 AT WHICH TIME A DETERMINATION OF ITS NEEDS BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

4946 - 414

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town GREENLAND County ~~HILLSBORO~~
Describe Bounds:

West Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1096/463

Registry HILLSBORO COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 1.0 ACRES HOUSE LOT

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT IS TO BE HELD UNTIL THE COMPLETION OF INTERSTATE 95 AT WHICH TIME A DETERMINATION OF ITS NEEDS BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

MADBURY

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported GRAVEL AND SAND PIT

Location: Town MADBURY County STRAFFORD
Describe Bounds:

A small parcel of land lying along the southerly side of the old Stage Road, so-called, in the Town of Madbury adjacent to the division line between said town and the city of Dover described as follows: Beginning at a concrete bound on the southerly side of the Old Stage Road, so-called, leading from Central Road at Kelley's Corner to Madbury, saidpoint being in the division line between the Town of Madbury and the City of Dover; and running thence S. 25° 14' E. with said town line and along the northwesterly line of land of Bernard T. Pacitto and with other land of the Grantor a distance of 575 ft. to a concrete bound; thence running S. 39° 20' W. with other land of the Grantor 265 ft. to a concrete bound; thence running S. 65° 20' W. with other land of the Grantor 300 ft. to a concrete bound; thence running S. 83° 12' W. with other land of the Grantor 340.5 ft. to a concrete bound in the northeasterly line of land of Rosa Hayes; thence running N. 13° 54' W. with said Hayes land 600 ft. to a concrete bound on the southerly side of said Old Stage Road, said point being at the northeasterly corner of aaid Hayes land; thence running northeasterly with the southeasterly side of the Old Stage Road a distance of about 763 ft. to the point of beginning.

Record of Title: Deed Reference 502/119

Registry STRAFFORD COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 11.25 ACRES

Present Use GRAVEL AND SAND PIT

Signed: _____

Title: COMMISSIONER

SEABROOK

5831-1

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported PATROL HEADQUARTERS

Location: Town SEABROOK County ROCKINGHAM
Describe Bounds:

Near Foggs Corner in Seabrook.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1614/66

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition MAINTENANCE BUILDING

Extent of Property (Number Acres, Buildings, Etc.) 2.0 ACRES

Present Use PATROL HEADQUARTERS

Signed:

Title: COMMISSIONER

5827 - 30, 40

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town SEABROOK County ROCKINGHAM
Describe Bounds:

North Side of Blackwater Road.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1374/37

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 4.0 ACRES MARSHLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT WILL BE HELD UNTIL THE COMPLETION OF ROUTE 95 AT WHICH TIME A DETERMINATION OF ITS NEED BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

4946 - 11

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town SEABROOK County ROCKINGHAM

Describe Bounds:

Sold

East & West Sides N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

See 1970 Change

Record of Title: Deed Reference 1106/117

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

200 ft. reservation on west

Extent of Property (Number Acres, Buildings, Etc.) 8.0 ACRES WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT WILL BE HELD UNTIL THE COMPLETION OF ROUTE 95 AT WHICH TIME A DETERMINATION OF ITS NEED BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

4946 - 101

QUESTIONNAIRE - STATE OWNED REAL PROPERTY

Department HIGHWAY Date 9-1-63

Property Reported TRACTS OF LAND OUTSIDE THE NORMAL RIGHT-OF-WAY

Location: Town SEABROOK County ROCKINGHAM
Describe Bounds:

East Side N. H. Turnpike.

For more accurate description, contact the Right-of-Way Division.

Record of Title: Deed Reference 1117/440

Registry ROCKINGHAM COUNTY

How Acquired DEED

Improvements Since Acquisition NONE

Extent of Property (Number Acres, Buildings, Etc.) 0.57 ACRE WOODLAND

Present Use NONE - THIS TRACT OF LAND WAS CUT OFF FROM ALL ACCESS. IT WILL BE HELD UNTIL THE COMPLETION OF ROUTE 95 AT WHICH TIME A DETERMINATION ON ITS NEED BY THE DEPARTMENT WILL BE MADE.

Signed:

Title: COMMISSIONER

S-4992-11

QUESTIONNAIRE - UP-DATED STATE OWNED REAL PROPERTY

(January 1, ~~19XX~~ 1966, through December 31, ~~19XX~~ 1967

Department Highway Date January 1,1968

Nature of Transaction: Disposal [ ] Acquisition [X]

Property Reported Tract

Location: Town Seabrook County Rockingham

Describe Bounds:

East side of I-95

For more accurate description contact Right of Way Division

Record of Title: Deed Reference 1858/160

Registry Rockingham

How Acquired or Disposed Deed

Improvements Since Acquisition None

Extent of Property (Number Acres, Buildings, Etc.) 0.48A

Present Use None. Purchased entirety of lot.

Signed:

Title: Commissioner

TABLE 3

HIGHWAY RIGHTS-OF-WAY AND EASEMENT DESCRIPTIONS

Dover

	Id. No.	Job No	Description	Year	ROW	Plan NO.
ew ystem	30	F-262(2)	Bridges	1950	From Sta. 81+00 To Sta. 107+92 ROW=100' From Sta. 107+92 To Sta. 142+100 ROW =66'	2122
	31	WPMH #54		1935	From Sta. 167+00 To Sta. 274+00 ROW=66	173
	32	NRM #195		1933	Sta. 150+00 To Sta. 172+00 ROW= (See 33*	202
	33	FA210-J FA109 FA 54		1937	From Sta. 76+30 To Sta. 274+75 ROW=66	292
	34	NRM #262		1933	From Sta. 26+52 To Sta. 289+61.75 ROW=66	327
	35		Old Survey Map Showing Park Areas Area Part B =11.60 acres Area Part C =12.36 acres	1937		235
	36	SAC 1644		1950	From Sta. 79+12 To Sta. 85+00 ROW-66' From Sta 169+00 To Sta. 181+50 ROW=66 From Sta. 181+50 To Sta. 195+73 ROW=60' From Sta. 195+73 To Sta. 197+00 ROW=50'	904
	37	LS				See L.S FILES
iting on esponse om NHDPNH or data	38	LS				"
	39	LS				"
	41	LS				"
	42	LS				"

d st	Road No	-	Grid No	ROW
		-	49	4RODS=66'
	9	-	49	4RODS=66'
	18	-	49	4RODS=66'
	25	-	48	4RODS=66'

Durham

[redacted]tem	Id. No.	Job No.	Description	Year	ROW	Plan No.
	80	NRH 211-C		1935	ROW=66'***	168
	81	NRS & M 249		1933	ROW=66'***	189
	82	TLR 14167		1950	From Sta. 20+50 To Sta. 31+50	865,509
	83	TLR 14194, P-2418		1953	ROW=100'***	973
	84	F-012-2(4) P-3879-B		1964	From Sta. 146+00 To Sta. 602+50 ROW=264'	9H
	85	P-7779	BETTERMENT	1966	ROW=66'***	2253
	86	P-1779	BETTERMENT Rte. 108	1972	From Sta. 9+75 To Sta. 19+50 ROW=83'	3112
	87	WPGS 298		1936	ROW=66***	189

Old System	Road No	-	Grid No	ROW
	1	-	49	4RODS-66'
	4	-	49	4RODS-66'
	7	-	49	4RODS-66'
	8	-	49	4RODS-66'
	20	-	49	4RODs-66'

[redacted]

[redacted]

EXETER

Ident. #	Job #	Description	Year	Plan	ROW
30	F-018-2(1)	100' to Stratham TL	1955	2072	STA 30+20-STA 33+10 ROW 66' STA 33+10-STA 34+65 ROW 50' STA 34+65-STA 39+75 ROW 10C STA 39+75-STA 49 ROW 55'-66 STA 49+100-STA 63+100 ROW1C STA 63+00 ROW 66'
31	P1384	Betterment-Exeter-Brentwood	1955	3025	STA 3+50-STA 7+50 ROW 75' Southern side and 25' Northern side Total ROW 100'
32		Rockingham County Courthouse-Route 101C to Route 88		2222	STA 8+00-STA 17+00 ROW 100'
33	F-018-2(8) P3380A		1959	4B	STA 99+00-STA 102+00 ROW125 (Equation STA 103+00=249B+0 STA 249B+00-STA 260B+00 ROW varies from 200'-500' STA 260B+00-STA 269B+00 ROW 225' Northernside-125' Southern side (Equation STA 269B=STA 45) STA 45+00-STA 102+00 ROW 35 STA 102+00-STA 113+00 ROW 400'-500' STA 113+00-STA 165+50 ROW 300'-350' (Between STA 156-159 state own) 11.9 acres on Southern side of Road STA 165+50-STA 173+50 ROW varies from 100'-225' Southern side + 200'-500' Northern side (Junction 101+108) STA 174+50-STA 186 ROW 400' 230' Northernside ROW 550 330' Southern side
34	EBF-020-1(2)	Exeter to Hampton TL		2F	STA 200+00-STA 204+00 ROW 350'-750' Rte 101 by-pass STA 214+00-STA 217-00 ROW 325'-475' STA 217+00-STA 239-00 ROW 475'-325' STA 239-STA 252+50 ROW 350' STA 253-00-STA 254+00 ROW 600' (Around Guinea R STA 254+00-STA 276+60 ROW 350-325 STA 276+60-STA 287+00 ROW 375' STA 287+00-STA 303+00 ROW 375'-800' (Junction 101-D)

Exeter (Continued)

dent. #	Job #	Descriptions	Year	Plan	ROW
35	TRA-B C-7345	Route 108 over Little River			Bridge (see Folder)
36	Southside Rd. - Route 101			546	ROW varies from 50'-100'
37	E-240-E	Route 101	1933	169	ROW varies from 50'-100'
38	TLB	Route 108, Exeter	1935	194	Bridge

OLD SYSTEM

Road #	Grid #	ROW
3	49	4 rods
7	57	3 rods
2	58	3 rods
11	58	3 rods

GREENLAND

Ident. #	Job #	Description	Year	Plan	ROW
71	SAR S-7836	Winnecut Road	1968	2284	STA 69-64+50 ROW 50' STA 64+50-60+50 ROW 75' STA 60+50-40+00 ROW 50'

HAMPTON

Ident. #	Job #	Description	Year	Plan	ROW
[redacted] 90		Marshes are to Mass. border	1935	2	Row generally 100'. Varies to 200' in places along shore.
91	WP6H-17		1935	172	STA 2-STA 15 ROW impossible to determine. At least the width of road
92	WP6H-37E	Route 1 railway overpass	1935	177	
93	PLAN	Route 1A	1933	186	No ROW indicated. State owns from Western shoulder to low tide line. Road wide varies from 30'-50'
94	F318(1)	3/4 mile strip. Hampton Beach and Bound Road including Hampton River Bridge	1946	186	STA 77+50-STA 49+60 bridge is 40' wide from 49+60 state land widens up to 400' at STA 108+50
95		Ocean Blvd-Route 1A from Little Boars Head to Plaice Cove Road	1936	751	ROW 100'
96 [redacted]	F021-1(1)	Route 1A	1955	2051	STA 158+00-STA 234+61 ROW 50' on Average. State owns some property on Western side of Road-Old hotel lots
97	EBF 020-(12)	101-C Hampton portion	1961	2-F	STA 302+00-STA 306+00-Intersection w/101-D ROW exceeds 700' STA 306'+00-STA 312+00. ROW 700'-350' STA 312+00-STA 345+50 ROW 350'-375' STA 345+50-STA 358+00 ROW varies on both sides of of road between 175'-500' STA 358+00-STA 378+50 ROW 400' STA 378+50-I-95 Intersectic ROW increases from 400' to 600'
98	F020-1(3)	I-95 Interchange	1962	4-H	Intersection w/101-C ROW averages 550' along I-95
[redacted] 99	F020-1(4)	Intersection Route 1 and new 101-C	1962	5-H	STA 35+50-STA 47+75 ROW's are extensive-1900-around intersection area

HAMPTON (Continued)

Ident. #	Job #	Description	Year	Plan	ROW
100	P4147-D	Beach feeder	1962	5-H	STA 535+90 (Landing Road) STA 609 ROW 200' STA 609 (Intersection w/ Glade Path) ROW widens to 350'
101		Bridge over Taylor River		Jacket 4997	STA 8-STA 12 ROW 50'-100'

OLD SYSTEM

Road #	Grid #	ROW
10	58	3 Rods

HAMPTON FALLS

Ident. #	Job #	Description	Year	Plan	ROW
130	SAB-C	Route 84/Hampton Falls River		Jacket 5833-1.2	STA 209+00-STA 202+00 ROW approx 70' at widest point near River ROW=150'

OLD SYSTEM

Road #	Grid #	ROW
10	58	3-4 rods

Madbury

New System	Id. No.	Job No.	Description	Year	ROW	Plan NO.
	60	P-3498	Rts #4 & #9 Over Mallego Brook		From Sta 69+00 To Sta 92+00 ROW=100'	2097
	61	SAB-C S-7464			From Sta. 2+00 To Sta. 18+00 ROW 100'	11-H
	62	S-1136 B-2144			From Sta. 86+00 To Sta. 97=00 ROW=66' w/ variances to random location of structures	3046
	63	FA 67(2)		1939	From Sta. 116+13.1 To Sta. 158+20 ROW=66'	731
	64	FAGS 13A (1)		1941	From Sta. 3+50 To Sta. 23+50 ROW=66'	585

Old System	Road No	-	Grid No	ROW
	6	-	49	4RODS=66'
	8	-	49	4RODS=66'
	18	-	48	4RODS=66'
	25	-	48	4RODS=66'

NEW CASTLE

Ident. #	Job #	Description	Year	Plan	ROW
50					MAP UNAVAILABLE

NEWFIELDS

Ident. #	Job #	Description	Year	Plan	ROW
15	P-7670		1966	2248'	ROW-66 feet

Old System

Road #	Grid #	ROW
3	49	4 Rods

NEWINGTON

Ident. #	Job #	Description	Year	Plan	ROW
1	SN-FAP 101(2)	12901	1940	741	STA 0+00-56+50 ROW 100' 56+50-61 ROW=66' 61+66 100'-150' 66-75 - 100' 75-70 100'-125' 78-80 150' 80-84 200'-150' 84-100 100' 100-110+80 125'
2		Old General Sullivan Bridge		235	Approach to General Sullivan Bridge from 1400' back on Newington side to 700' on Dover side ROW=100'
3	F262(2)	Route 16	1950	874	Included in Dover description
4					Included in L.S. plans
5					Included in L.S. plans
6					Included in L.S. plans
7					Included in L.S. plans
8	LS1820(1)	Spaulding Turnpike	1955		86+19 Station - Portsmouth Newington T.L. 197S - Dover-Newington T.L ROW generally 100' on eith side of mediam strip. Ownership of property with 1 mediam strip varies. See L.S. files for specific details

Old System

None

Newmarket

ew
ys

Id. No.	Job No	Description	Year	ROW	Plan No.
1	WPGH 272-B		1936	ROW=66***	178
2		Grade X-ING Rte. #108 & BMRR		From Sta. 36+50 To Sta. 70+80.3 ROW **	521
3	S33 (1),C-2763	Bridge on Rts. 108	1954	From Sta. 3+00 To Sta. 6+00 ROW?**	996
4	NRH 211-C		1935	From Sta. 3+50 To Sta. 103+40 ROW=66'	168

)ld
System

Road No	-	Grid No	ROW
2	-	49	4RODS=66'
3	-	49	4RODS=66'
5	-	49	4RODS=66'
23	-	49	4RODS=66'
24	-	49	3RODS=49.5'
25	-	49	3RODS=49.5'

NORTH HAMPTON

Ident. #	Job #	Description	Year	Plan	ROW
80	S-7840	Route 101-D		2226	STA 6+07-STA 17+37 ROW 66
81	NRH #37D	Route 1	1935	524	STA 4+00-STA 8+50 Greenland Road & B&M RR ROW 38'
82		I-95			See separate sheet for I-95 description

Old System

Road #	Grid #	ROW
3	58	3 Rods
4	58	4.5 Rods
5	58	3 Rods
6	58	3 Rods
8	58	40 feet
13	58	see layout
15	58	2.5 Rods
16	58	3 Rods
17	58	3 Rods
18	58	4 Rods
9	49	3 Rods
19	49	3 Rods

PORTSMOUTH

Ident. #	Job #	Description	Year	Plan	ROW
15	NPM 152		1933	183	1+50-49 Width of road 24' No ROW indicated beyond pavement
16	SN-FAP	129(2)	1940	741	Newington-Portsmouth TL 110-114 ROW=100' 114-129 ROW 100'-160' 129-131 125'-66' 131-156 66'
17	P-399		1940	567	2+00 Bridge Extent of pavement 26' No other ROW indicated. Assumed to be 50'
18	SN-FAP	152 D(1)	1941	769	Map not available
19	P2582 P2583		1953	986	Bridge
20	SAC 1648		1951	908	STA 3+00-30+00 ROW 100'
21	WI-37(7)		1953	2016	STA B4+50-18-18 ROW 50'
22	Route 1 By Pass approach to interstate bridge		1954	982 712	ROW varies from 100'-120' Except around interchanges where ROW is more extensive
23	F-018-2(4) P-2977		1957	2118	STA 432+50-436 - ROW 125' 436-441 ROW 100' 442-477 ROW 150' 477-480 ROW 125' 480-571 ROW 150' 572-585 ROW 55-60' 585-589 ROW 80'
24	V001-1(1)		1963	9E	125+50 - 128 - 66' 128-138 ROW 66'-90' 138-158+60 ROW vanes 60-9(depending on property line
25					
26		Included in			
27		I-95 description			
28					

PORTSMOUTH (Continued)

Ident. #	Job #	Description	Year	Plan	ROW
29					
30		Included in I-95 description			
8		Spaulding Turnpke from Portsmouth traffic circle to Newington TL			STA 35-86S ROW 200' Except in area of new I-95 construction

Old System

None

Rollinsford

	Id. No.	Job No	Description	Year	ROW	Plan No.
New System	11	S-224(1)	Rt #4	1958	From Sta. 30+50 To Sta 167+50 ROW=100'	2122
	12	S-7224	Roberts' Ro.		From Sta. 11+50 To Sta. 43+50 50' North Bound Lane 33' South Bound Lane ROW=83' Total	G-10
	13	S-1072=A			From Sta. 167+50 To Sta. 205+60 ROW VARIES FROM 190' to 95' Due to Random Location of Structures	0-11
	14	FAGS #1(0-51)	B&MRR in Village		From Sta. 10+50 To Sta. 62+50	3098

Old System	Road No.	-	Grid No	ROW	
	18	-	49	4RODS=66'	

ROW not delineated by plans, however jog is duplicated and ROW given by the job associated with given reference number
ROW, not delineated by plans.
Because of changing equations stationing not given

RYE

Ident. #	Job #	Description	Year	Plan	ROW
60	TLR 14200 P-2449		1954	2016 491	See Plan
61	Ocean Boulevard, Route 1A			638	Difficult to determine. Width of road varies from 30'-50'
62	DA WRY	Route 1A over Seavey's Creek	1942	609	
63	Ocean Boulevard, Route 1A			977	Same as above

Old System

Road #	Grid #	ROW
9	49	4 Rods
16	49	See layout
17	49	3 Rods
1	50	See layout
2	50	See layout

SEABROOK

Ident. #	Job #	Description	Year	Plan	ROW
140	S 26(1)	Route 286 Bridge over Blackwater Road intersection on Route 1A at Major's Rock	1947	714	126+50-140+90 ROW 100' 140+95-141+33 Bridge 141+33-152+50 ROW 100' 150+50-158+50 ROW varies from 300'-500'
141	526(2)	Route 286 From Mass Bridge to Blackwater Road	1957	2074	STA 7+35-16+30 ROW 50' 16+30-18+25 ROW 125' 18+25-22+00 ROW 100' 22-25-175'-100' 25+00-175'-100' 25+00-126+50 ROW 100' with some minor variations
142	P-7488-J	I-95 Mass border to intersection Route 107	1967	3088	100-106 ROW 350' 106-121 ROW 650' on southern side. 150' on N. 121-141+50 350' 141+50-146+50 350'-550' 146+50 - 150 725' (150 on N - 575 on S) 150-153 150' on N side 425' on South side 153-156 300' on N side 200' on S side (Rte 107 junction) 157-159+26 ROW narrows to 300' (150' ea. side)
143	S-68(3) S-1544	TL Hampton Falls New Zealand Road Intersection w/Route 107	1972	3117	STA 1438-1445+70 ROW-150'-275' 1445+70-1449 ROW 275'-225' 1449-1461+50 ROW 225' 1461+50-1468 ROW 225'-160' 1468-1510 ROW 160' 1510-1513 ROW 160'-200' STA 1513+64=STA 10+99 10+99-24+15 ROW 200'
144	FAGS 24A(1)	Bridge over B&M RR	1940	710	
145	FA 244A R-1, R-17	Mass border to Taylor River STA 138-155-ROW50'-60'-40' 155-157 ROW 25'	1970	182	STA 0-5+00 ROW 60' 5-8+80-ROW100'-125' 8+80-10+53-ROW 150' 10+53-24+50 ROW 50'-60' 24+50-30+00 ROW 70'-120' 31+00-72+50 ROW 50'-65' 73-76 ROW 25' 77-115+60 ROW 50'-60' Hampton Falls TL 118+00 121 ROW 45'-50'

Ident. #	Job #	Description	Year	Plan	ROW
		157-163 ROW 50' 163-166 ROW 20' 166-198 ROW 50'-75'-50' 138-150 ROW 50'-60'			121-123 ROW 50' 123+50-126 ROW 100' 127-137 ROW 60'-75'
146		Ocean Road Route 1A Mass border Seabrook bridge	1906 1935	198	ROW 100' until bridge where it widens to 215'
147		Traffic circle Smithtown	1936	200	Radius of circle 100'
148	TLR 14, 110	Smithtown		201	0+02-11+40 Area around traffic circ See plan for details

STRATHAM

Ident. #	Job #	Description	Year	Plan	ROW
30 Cont. from Exeter TL	F-018-2(1)		1955	2072	STA 73+00-84+00 ROW 100 STA 84-86 ROW 85' STA 87-90 ROW 135' STA 91-118 ROW 100' STA 118-124 ROW expands to 190' STA 124-164+50 75'-100' range STA 165-173 varies 75'-85' w/property lines 173+50-175 ROW 150' 175-182 ROW 100' 112-188 ROW 150'-200' 188-205-Interchange ROW Extends over 500' 205-227 66' 227-264 ROW varies 75'-100'
45	FA272-A Route 108		1936	196	STA 4+50-STA 72+00 ROW 66
46	S-220(1)		1959	4-A	STA 175+00-STA 182+00 650'-380'
	P3381				STA 182-STA 227+00 ROW 380 STA 227-STA 233 (101-C) 380'-750'
47	F-018-2(9)		1959		STA 264+00-STA 310+00 ROW 100'
	P-3769		1959	8A	STA 310-323 ROW 200' 323-330 ROW 100' 330-339+50 ROW 150' 339+50-341 ROW 100' 341-358+50 ROW 150' 358+50-361 ROW 125' 361-367+50 ROW 100' 367+50-392 ROW 125' 392-417 ROW 100' 417-427 ROW 150'-200'

Old System

Road #	Grid #	ROW
10	49	3 Rods
12	49	See layout
13	49	3 Rods
14	49	1.5 Rods
14	49A	1.5 Rods
15	49	3 Rods
2	58	---

Interstate 95 Widening

The following is an inventory of easements obtained as part of the Interstate 95 construction, and the project of 1974. Rather than separate this project by towns, we have included all the inproved sections in the following manner. The area concerned is basically the whole length of I-95, from the Massachusetts border in Seabrook to the completion of the construction in Portsmouth.

The plans consulted for Seabrook and North Hampton are S-3 and S-4. The Portsmouth plans are P-8 and P-10, and also 6-F and 9-E.

Job No.	Seabrook - Portsmouth	
142	STA 141-158:	Route 107 Interchange. LAROW covers an area around quarter clover leaf of about 1000'.
	STA 158-165	ROW 300'
149	STA 66-68:	ROW 350', because of additional easements of 50' on eastern side of road. * Note: here STA numbers change from 165 to 66.
	STA 94+50:	Relocation of Route 84, easements vary-Consult S-3
	STA 97+50-122+40:	350' ROW with eastern additions resumes
	122-40-126+70:	ROW increases towards maximum of 500' at latter station
	STA 126+70-150:	300'-350' ROW resumes until Route 88, where ROW widens. Consult S-3.
	STA 150-194:	ROW 350'-400', eastern easements.
	STA 194-200:	Here I-95 is bounded on the west by the Taylor River, at the expense of 100' of usual easements. To maintain the approximate 400' ROW, 100' of extra land was acquired on eastern side of I-95.
	STA 200-229:	400' ROW
	STA 230-:	Relocated Towle Farm Road. ROW many and varied. Consult plan.
82	STA 342-404:	ROW approx. 400' extra ROW along South Road at STA 348 extra ROW along Route 101-D at STA 368 extra ROW along Walnut Avenue at STA 404
	STA 405-429:	500' ROW increase of ROW due to PSC aquisition for power line relocation.
	STA 430-443:	350' ROW
82	STA 443-453+53:	Intersection with Route 151. ROW large and varied. Much land acquired from Sagamore-Hampton Golf Clubs and private landowners. Consult plans S-3 and S-4.
83	STA 450-520:	375'-400' ROW 50' additional ROW now on western side

Job No. Seabrook - Portsmouth

STA 520-536: approx. 525' ROW
Highway ROW is approx. 375', including the extra 50' western easements
In addition, on eastern side is 150' of power line ROW

STA 536-549: 375' ROW by Highway Department
+100' ROW by PSC for power lines
475' ROW total

STA 549: Intersection of Breakfast Hill Road. Consult plan S-4

STA 551-638: 350' ROW by Highway Department
+125' ROW by PSC for power lines
475 ROW total

STA 638-640: Intersection with Relected Ocean Road. See S-4 375' ROW
100' PSC ROW
475' ROW tot

25 STA 670-683: 500' ROW
680-706: ROW exceeding 1000'
Route 101 Interchange in Portsmouth. See Plans 6-F and P-8. Extensive easements.

26 Route 1 Bypass., rotary, Interchange with Route 4 and 16. Consult plan 9-E.

27 Route 1 Bypass continued. See plan P-8.
*NOTE: Extensive ROWS within jobs 26 and 27, but all ROW outside LAROW deeded to the City of Portsmouth

28 STA 505+00-524+23.25: I-95 continuation in Portsmouth

29 STA 524+23.25-end of N.H. portion at bank of Piscataqua River. Plan P-10, 1970, shows ROW takes for completion of I-95. Consult plan.

W.P.

INVENTORY OF LAND USES

INVENTORY OF LAND USES

In partial fulfillment of paragraph 2B of the FY '75 Coastal Zone Contract an inventory of existing land uses was undertaken. Rather than repeat at length the recent land use studies previously undertaken by both the Southeastern New Hampshire and Strafford Regional Planning Commissions, a brief summary and detailed maps are provided. For more specific land use descriptions see the following references:

a. Existing Land Use, 1973. Southeastern New Hampshire Regional Planning Commission.

b. Southern Strafford Region, An Environmental Planning Study, pending. Strafford Regional Planning Commission.

Land use was combined with vegetative cover for mapping purposes as is discussed below. All of the maps were based on aerial photographs, almost all of which were at a scale of one inch equals approximately 1667 feet. Depending on the specific area of the coastal zone, however, different series of photographs were used. All towns that fell within the jurisdiction of the Strafford Planning Region were mapped from existing maps which were part of reference b above. These existing maps used 1962 and 1968 (Dover only) photos with detailed field checking. These photos were provided by the Strafford County Forester and the Dover city planner, respectively. The Kittery-Isles of Shoals, Portsmouth, Hampton-Newburyport Quads. were mapped from 1"=2000' acetate overlays provided by the Photographic Interpretation Corporation (PIC). These overlays were part of their pilot mapping project for OCP. Much of the Newmarket and Exeter Quadrangles were mapped from 1974 photos provided by the Rockingham County Forester. These were also field checked.

The coastal area of New Hampshire has a variety of land uses ranging from remnants of early colonial farming to the recent residential, commercial, industrial and commercial-recreational developments. The historical blend of agriculture and industry in the mill towns such as Exeter and Dover and the more marine oriented commerce towns along the Atlantic coast have given way to residential subdivisions, strip commercial development, and intense commercial-recreational uses along much of the coast. Since the land use and vegetative cover maps show only an instant in time, it is difficult to protray this process, but the preponderance of the new types of development can easily be seen on the various maps.

This map combines both land use--where there is evidence of man's activities on the land--and vegetative cover--where there is no permanent evidence of man's activities. Often planners distinguish these two factors by using separate maps for each. For purposes of this study it was felt there would be no real loss in information for coastal zone planning. It is essential to know how much of the area is currently used for residential, commercial, industrial, recreational, etc. and how much is undeveloped. From this information and an analysis of competing demands for the land, allocation of future uses to remaining undeveloped spaces in a balanced pattern can be achieved.

The land use classification system which follows was arrived at after much deliberation. Discussions with Paul Brunz at UNH who was engaging in a land use study, as well as the consultants from PIC helped clarify our own thinking. A scheme was arrived at that is most appropriate for the scale of mapping and useful for planning purposes.

Land Use & Vegetative Cover

Map Code	
	Residential
1a.	Low density 1 D.U. per acre 1/
1b.	Medium density 1-4 D.U. per acre
1c.	High density > 4 D.U. per acre
1d.	Mobile home park
	Commercial
2a.	CBD, etc.
2b.	Warehousing and storage
2c.	Isolated business
	Industrial
3a.	Heavy (power generations, etc.)
3b.	Light
	Extractive
4a.	Fishing
4b.	Mining
	Waste Disposal
5a.	Dumps
5b.	Sewage treatment facilities
5c.	Junkyards
5d.	Incinerators
	Recreation
6a.	Marinas
6b.	Beaches

1/ Based on modifications to categories used in the Preliminary Comprehensive Land Use Plan for Substate District # 6, and the Southeastern New Hampshire Land Use, Report # .

Recreation (cont)

6c. Athletic fields and Playgrounds

6d. Public Parks and Forests

6e. Campgrounds

6f. Gold courses

Transportation, Communications and Utilities

7a. Highways

7b. Powerlines

7c. Railroads

7d. Airports

7e. Auto parking

7f. Railyards

7g. Water treatment

7h. Harbor and dock facilities

7i. Pipelines

Agriculture

8a. Croplands

8b. Fields and Pastures

8c. Orchards

8d. Other

Woodland

9a. Forest land

Wetland

10a. Mud flat/sand bar

10b. Tidal marsh

10c. Fresh water

Institutional

12a. Schools

Institutional (cont)

12b. Colleges

12c. Churches

12d. Hospitals

12e. State Prisons

12f. County Farms

12g. Military (Pease Air Force Base)

12h. Cemetary

12i. Historic

12j. Government function

13. Public Water Supply Lands

Water

14a. Rivers

14b. Lakes, Ponds, and Reservoirs

15. Abandoned land (fields, orchards, etc.)

W.P.

INVENTORY OF HISTORIC AREAS AND SITES

Inventory of Historic Areas and Sites
(See Map - Areas of Particular Concern)

In New Hampshire there are three ways of officially recognizing that a place has historic significance. They are:

1. Listing on the National Registers maintained by the U.S. Department of the Interior, more particularly, the National Register of Historic Places;

2. Listing by the State of New Hampshire as an Historic Site;

3. Classification by the municipality as an Historic District.

These listings are not mutually exclusive and one place may fit criteria for all three listings - for example the site of the (former) Exeter Town House is a state historic site located in a municipally created historic district, and the district is listed on the National Register of Historic Places.

Each listing implies that the place is of importance in the history of the locality, the state, or the nation. Such a listing should sound an informal warning, in addition to any legal sanctions involved, that may well be an area not suitable for vast transformation and heavy development.

Each listing has a slightly different purpose, entails different criteria for designation, and results in a different legal situation.

1) Listing on the National Register of Historic Places is done under the National Historic Preservation Act of 1966. The register lists the nation's historic and architectually significant structures, sites, and areas of national, regional, state and local significance. Under the act, a federal Advisory Council was created which must review federal, or federally licensed actions which affect a building or site on the Register. This review, if negative, is not tantamount to a veto but is a factor to be considered in deciding whether or not the federal action should proceed. This is a strong presumption, however, that federal actions should "not despoil the environment or adversely affect property which has been officially designated as historically or architectually significant." Ely II 497 F. 2d 252, 256 (1974).

The process for designation involves nomination by a private citizen or group, or a public agency, review and recommendation by the state Historic Review Board, and forwarding of this material to Washington where it is in turn reviewed. Designation is by notice in the Federal Register.

Listing on the New Hampshire listing of historic sites is done by the state Historic Commission under RSA 227A or RSA 249:39-a in cooperation with the state Department of Public Works and Highways, and/or local governments.

Such a listing is primarily for places where events have taken place rather than for places of architectual interest only. Nomination can be made by private citizens or groups or public agencies. Listing is consumated by the placement of a state Historic Marker at or near the site. No additional legal protection is afforded the site by this process.

Establishment of an historic district is accomplished under NH RSA 31-89a-j by the municipal zoning authority (i.e. city council or town meeting). In a two step process, an Historic District Commission is created by the zoning authority, the Commission in turn recommends the boundaries and regulations for a specific geographic area, the zoning authority again acts to accept or reject the recommendation. If accepted the local commission must approve or disapprove all building permit applications for the area. Its jurisdiction is confined to regulating the <u>exterior appearance</u> of the district.

The list which follows indicates all of the properties on any of the three, those places in the process of designation, and those places the staff of the Strafford Rockingham Regional Council feels ought to be considered for designation in the future.

INVENTORY OF HISTORIC AREAS AND SITES (see maps)

EXETER

1. FEDERAL REGISTER

   Official: Congregational Church, 21 Front Street

   Dudley House, 14 Front Street

   Front Street Historic District

2. STATE HISTORIC SITES

   Official: Exeter Town House, Court and Front Streets

3. HISTORIC DISTRICTS

   Official: Front Street-Water Street-Pine Street-Spring Street

   Suggested: Park Street Common

   High Street and Hall Place, Franklin, River, Bow, Clifford and South Street

GREENLAND

2. STATE HISTORIC SITES

   Breakfast Hill

3. HISTORIC DISTRICT

   Suggested: Town Center

HAMPTON

1. FEDERAL REGISTER

   Weare, Gov. Neshech House, Route 88

2. STATE MARKERS...SITES

   George Washington's Visit

HAMPTON (Continued)

3. HISTORIC DISTRICT

Suggested: Lafayette Road; Brimmers Lane-Depot Road; and Kensington Road

NEW CASTLE

1. FEDERAL REGISTER

Fort Constitution (off Route 1B)

2. STATE HISTORIC SITE

Fort Constitution, William and Mary Raids

3. HISTORIC DISTRICT

Officially Proposed: Area between Portsmouth Bridge and Fort Constitution. Along 1B and including area between 1B and Water. (North)

NEWFIELDS

3. HISTORIC DISTRICT

Suggested: Town center along Route 85 and Piscassic Road

NORTH HAMPTON

3. HISTORIC DISTRICT

Suggested: Atlantic Avenue (101D) to beach

Intersection of Atlantic Avenue, Hobb's Road and Post Road

PORTSMOUTH

1. FEDERAL REGISTER

Official: Beck, Samuel House, 107 Deer Street

Benedict House, 30 Middle Street

Hart, Jerimiah House, 112 Deer Street

Hart, John House 63 Deer Street

Hart, Phoebe House 184 Deer Street

PORTSMOUTH (Continued)

Hart - Rice House, 77 Deer Street

Jackson, Richard House, North West Street

Jones, John Paul House, Middle and State Streets

MacPheadris-Warner House, Chapel and Daniel

Hoffatt-Ladd House,, 154 Market Street

Neal, James House, 74 Deer Street

Nutter-Rymes House, 48 School Street

Pinkham, Daniel House, 190 Deer Street

Portsmouth Athenaeum, 9 Market Street

Portsmouth Parade Historic District

Portsmouth Public Library, 8 Islington Street

Shapley Town House, 454-456 Court Street

Sherburne, Henry House, 73 Deer Street

Smith, Simeon P., House, 94 Russell Street

Wentworth, Gov. John House, 346 Pleasant Street

Wentworth, Joshua House, Strawbery Banke

Wentworth-Gardner House, 140 Mechanic Street

Whidden-Ward House, 117 Deer Street

Officially Proposed: Strawbery Banke Historic District

2. STATE HISTORIC SITE

Official: Portsmouth Plains, N.H. 101, East of Junction of Route 95

3. HISTORIC DISTRICT

Official: Strawbery Banke Historic District

Vaughn Street Renewal Area (Deer Street)

Officially Proposed: Market Square

PORTSMOUTH (Continued)

Suggested: Christian Shores (42 pre-1825 structures)

Middle Street (51 Buildings, preceeding 1825)

South End (118 structures pre-1825)

RYE

1. FEDERAL REGISTER

Officially Proposed: Isles of Shoals

2. STATE HISTORIC SITES

Official: Isles of Shoals

Atlantic Cable and Sunken Forest

Odiorne's Point

Suggested: Brackett Massacre Burial Ground

3. HISTORIC DISTRICT

Official: Rye Center

Suggested: Expanding district to include: Washington Road, Brackett Road, Central Road, Locke Road, and Grove Road

SEABROOK

1. FEDERAL REGISTER

Salisbury Academy Building

2. STATE SITES

3. HISTORIC DISTRICTS

Suggested: Lafayette Road from Millpond to Deaborn Road

STRATHAM

3. HISTORIC DISTRICT

Suggested: Town Center

DOVER

1. FEDERAL REGISTER

   Official: County Farm Bridge

   Proposed: Woodman Institute

2. STATE HISTORIC SITES

   Hilton Point

3. HISTORIC DISTRICTS

   Proposed: Silver Street, Locust Street, parts of Central Street
   the Mills and adjacent housing

ROLLINSFORD

3. HISTORIC DISTRICT

   Proposed: Salem Falls

DURHAM

1. FEDERAL REGISTER

   Official: John Sullivan House

2. STATE HISTORIC SITE

   Official: Site of Piscataqua Bridge
   Oyster River Massacre

3. HISTORIC DISTRICT

   Official: Main Street and Route 108

NEWMARKET

3. HISTORIC DISTRICT

   Proposed: Downtown including granite block and stone structure mills

W.P.

DRAFT

SCENIC ASSESSMENT

Prepared by

Southeastern New Hampshire Regional Planning Commission

3 Water Street

Exeter, New Hampshire

Beauty is in the eye of the beholder. It is therefore difficult to assess the quality of scenic views. This assessment is necessarily subjective. The general criteria used were:

1. Highest value - a combination of
    a. a distant view - a relatively stable backdrop
    b. a near view = some activity to watch, and
    c. a place to view from

The typical rocky ocean shorefront fullfills all these criteria:

a. there is a distant view of the ocean, perhaps with a fishing boat, or tanker, and often the Isles of Shoals;
b. there is a near view with some activity such as waves surging and spraying on the rocks and gulls swooping and diving;
c. there is a place to view from, either a road to look out a car window from, a seawall to lean on, or a bench, or a rock to sit on.

A scenic area need not be a natural area. Portsmouth Harbor, which is highly developed, fullfills all these criteria. There is a distant view of developed shoreline, a near view of shipping or boating or human activity, and there are many places to stop and watch from.

Neither must the viewer remain stationary to enjoy a scenic view. The older parts of New Castle can be best enjoyed on foot or by bicycle. The "cottages" along the shore in North Hampton and Rye may be best enjoyed, by the public, from the window of a moving automobile.

Highest value views are those that many people seem to enjoy going to see on purpose, as an end destination of a recreation oriented trip. Something people

find worth taking a picture of or even worth using as a model for a sketch or painting.

Medium value views generally consist of either a distant, stable, view or a short range active view, but not both. The viewer's interest is not held very long. A typical example is the view of the Atlantic from a sandy beach or the Great Bay from almost anywhere. Other than rather monotonous wave action and perhaps some bathers, or fishermen in season, nothing much happens. Yet people do stop and look, and do enjoy riding in an automobile past such places. Most of the major roads in Rye, many roads in other towns, and the beaches all along the coast fall into this category.

The final category, "some value" is just that -- a well trained, educated or peculiarly interested eye sees something worth viewing. The average man does not -- saltmarshes other than those at Hampton-Seabrook, and downtown Dover, are perhaps typical of this category.

Some views can be enhanced by <u>providing</u> the missing basic element:

1) a distant view can sometimes be provided or enhanced by cutting trees, removing signs, or by building an elevated view-point;
2) a near view can be improved by providing a place to view from -- usually a place to park cars, or a place to sit, or an activity to watch. The various "parkways" in and around this country's metropolitan areas were orginally constructed for the purpose of providing recreational driving for a scenic view, for example.

Although there are a great many scenic views, the following lists only those in which coastal waters play a role. The maps indicate other important views.

SCENIC AREAS

Of:	The View: From:
1. HIGHEST VALUE	
The Atlantic Ocean	Great Boar's Head - Hampton Little Boar's Head - Fox Point North Hampton Rye Ledge - Rye Rocky Shore North of Jenness Beach - (No public access) Ragged Rock Point - Rye Rye North Beach - Rye Concord Point - Rye Wallis Sands - Rocky shore north to Witch Creek - Rye Isles of Shoals - Rye
Isles of Shoals	Atlantic Ocean
Portsmouth Harbor Maine Shore	Piscataqua River/Harbor Portsmouth shore
New Castle	Atlantic Ocean
Harbor Islands	Piscataqua River, Little Harbor, Sagamore Creek
Sagamore Creek, Portsmouth	Portsmouth shore
Great Boar's Head	Atlantic Ocean
Great Bay	Adams Point
New Castle	internal streets
Rye	most internal streets
Downtown Portsmouth	internal streets
Odiorne's Point State Park	internal streets and trails
Rye Harbor	shoreland
Hampton Harbor	shoreland
Seabrook Harbor	shoreland
2. MEDIUM VALUE	
Other shoreland of Portsmouth, Rye and New Castle	Little Harbor
New Castle shore	Piscataqua River

Of:	From:
Remainder of Atlantic shore	Atlantic Ocean
Great Bay	Stratham Hill (Public) Other high hills (Private)
Ports of Portsmouth and other municipalities	internal streets
Atlantic Ocean	area along Atlantic shore not listed above - primarily the beaches

3. SOME VALUE

Shore of Great Bay and tributaries to mill dams	Great Bay and tributaries
Shorefront cottages, other places	Great Bay and tributaries, Atlantic Ocean
Other parts of coastal towns	internal streets

W.P.

NEW HAMPSHIRE COASTAL ZONE STUDY

VARIOUS COASTAL ECOSYSTEMS

AND

THEIR RESPONSE TO INTRUSION BY MAN

COASTAL HABITATS

Introduction

In assessing a coastline for management planning, it is essential to consider each coastal habitat to estimate its sensitivity and capabilities for human endeavors. It must be borne in mind that an attempt to separately and completely evaluate the many inter-dependent ecotypes is impossible because of the complexities of their interactions. No one part of an ecosystem operates independently of any other.

Looking at the coastal and estuarine waters of the State of New Hampshire as a series of natural habitats provides useful information. Areas of high natural value, either as breeding and nursery grounds or areas of important nutrient production can can be delineated. This contributes to one part of the determination of "geographic areas of particular concern". Other areas of concern, such as areas of industrial and commercial value, recreational value, or of value as resources for economic development were investigated concurrently, and are described elsewhere in the program.

This approach helps to provide a framework for the analysis of future proposals for uses of the New Hampshire coastal zone. Detailed, though incomplete information has been gathered previously on various coastal ecosystems (TRIGOM (1973), TRIGOM (1974), Odum et. al. (1974)). For the present, only a brief overview of the various coastal ecological systems occuring in New Hampshire is given. It is drawn largely from the sources listed. The relative value of the habitats is estimated, and some indication of ecosystem response to man-induced changes will be presented.

The coastal ecosystem is considered as a highly interacting system, the estuaries and the open ocean serving as key bases with migrating subsystems relating

them in their transitions. The interplay between the habitats is dealt with, emphasizing the interaction between them as functionally related entities.

Habitats

The habitats are defined as subsystems of the marine environment having similar physical/chemical variables, and which have characteristic populations or communities. Great overlap in areal extent and species occur. The "selected species" discussed here are not necessarily ecologically dominant. They have been drawn from reference studies and knowledge of the New Hampshire seacoast because they are of commercial/recreational interest, are unique in their nature, or are well known.

Habitats whose location and importance will be dealt with here have been derived from TRIGOM (1973) and Odum, et. al. (1974). These are existing natural habitats to be discussed:

1. Estuarine
2. Worm-Clam flat
3. Oyster-Mussel reef
4. High velocity ecosystems
5. Salt marsh
6. Rocky shores
7. Sandy beach/shore
8. Coastal and open water pelagic
9. Offshore bottom

Generally, the coastal ecosystem is a dynamic one.* Response to man-induced stress can be predicted for each habitat when one realizes its requirements, energetics,

* The life there has had to adapt very specifically to a rather intense regime. This reduces its flexibility to adapt to new environments, and makes for a system highly vulnerable to changes.

and sensitivities.

Estuarine

An estuarine ecosystem is defined by Clark (1974) as any semi-enclosed coastal water body with an open connection to the sea and a measurable quantity of salt in its waters (greater than 0.5 ppt).* Estuaries are strongly affected by tidal action, and within it sea water is mixed with fresh water from land drainage, thus forming three characteristic water types: low salinity, medium salinity and high salinity. The oligohaline (low salinity) estuarine system generally exists at the river mouth. The uni-directional river flow changes to circulational flow such as that found in a wide, shallow body of water. The point where the Squamscott River enters Great Bay is one such example. The oligohaline areas gradually blend into areas of medium salinity, so it is difficult to distinguish the two. According to Odum, et. al. (1974), there are no precise boundaries due to variations caused by tidal cycles, rainfall, circulation, evaporation and so forth.

The estuarine environment provides protection from wave action, allowing plants to root, clams to set, and the retention of suspended life and nutrients. Light penetration to the bottom enhances plant growth and tide flat biota. The fresh water inflow constitutes the top layer over the salty, heavier waters, permitting stratification and circulation. This enables transport for suspended life and nutrients which flow in under the salty layer and out via the surface. The tidal rhythm acts as a regulator of feeding, breeding, and other functions. The estuary is generally silty and variably turbid and is protected from predators due to the variable salinity and shallow water.

The estuarine ecosystem is a vital area with high value as a natural habitat.

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* The Great and Little Bays and the Hampton-Seabrook estuary comprise principal estuarine systems in New Hampshire.

Varying levels of salinity provide primary support for a number of species that are dependent upon a particular saline concentration. Estuaries are required by invertebrates and marine fish for residence during part or all of their life cycle. Bluefish, menhaden, shrimp and fluke spawn in open sea and then migrate to the estuaries. Clams are abundant here, in lower salinity areas, and migrating species such as the striped bass, Atlantic mackerel, and Atlantic cod use this system at various times of the year (See Table #1 - Occurrence of Important Migratory Fishes in Great Bay Estuary). For recreational use, the clam flats present in Great Bay and Hampton-Seabrook are important, and there is a recognized striped bass and smelt fishery at various times of the year. Striped bass occur in the estuaries primarily from May through November and smelt from October through June. Areas of the Piscataqua River, Great Bay, and Hampton-Seabrook estuaries are also used as breeding-nursery areas by alewife, coho salman and winter flounder. It is an accepted assumption that oceanic fishes in general are primarily dependent on the estuary (Clark, 1974).

The estuary is extremely productive, as it supports heavy beds of underwater vegetation. The photsynthetic processes of the vegetation convert energy to a useable food source, providing high food production. The grasses also produce oxygen, necessary for an aerobic system, and they stabilize the bottom sediment (Clark, 1974). Estuaries also serve as traps for nutrients, utilized by young migrating species for growth. The estuarine habitat also acts therefore as a route through which many pollutants pass to become concentrated elsewhere. A number of waterfowl might be added to indicate the significance of the estuary as a natural habitat. In Great Bay, Stevenson, et. al. (1974) determined that more than 27 species of waterfowl use the area, with Canada Geese, Greater Scaup and Black Duck totalling 90 percent of the population. Their report goes on to state that during the fall the Great Bay area is used extensively for the hunting of these species.

Characteristics of estuarine systems to be noted include the presence of a plankton-based food chain. Herring-like fish eat the tiny plankton and are in turn eaten by larger fish or harvested by man. Coastal plankton exist between the estuary and the open ocean, and along with other migrating subsystems, links the two. The estuarine system is used as a breeding and nursery area, and migrating species provide visible indication of the interrelatedness of various ecological systems. The organic production of tidal marsh is exported to the estuary where species feed on it to convert otherwise unusable organic material into animal matter. Characteristically, estuaries are more productive than either the sea or freshwater.

Estuarine responses to man-induced stress have not been completely investigated. Odum, et. al. (1974) report that "by and large the popular impression that a general decline in the population of migrating organisms has occurred over the past several years is correct." Among the modifications of the estuary which affects migrating species are dam construction (present on each of the major rivers emptying into the Great Bay), dredging and filling of wetlands and waterways, and disposal of various chemical and organic wastes. All of these have occured to some extent in New Hampshire coastal waters.

Locally, Normandeau Associates (1970) indicated the following: "Historical evidence indicates that the Piscataqua River Estuary was noted for its richness of marine life. Salmon, shad, cod, lobster, clams and oyster were present in such abundance that they not only supplied the populace with a major supply of seafood, but were even used as food for domestic animals. A noticable decline in these marine sources occurred after the beginning of local industrial development about 1800. This decline has been traced to destruction of bottom habitat through sedimentation, exclusion of fish and breeding grounds by dams on the rivers, and domestic and industrial pollution."

Estuarine organisms can react to environmental stress as all other existing life forms do. They have three alternatives: either adapt, migrate or die. Since the coastal environment has intense natural stresses to which the organisms have adapted in a very specifically and highly specialized manner, the alternatives are not favorable.

The source of pollutants which might affect estuaries is, in most instances, inflowing streams. Fish in particular are vulnerable to toxic elements, such as heavy metals or hydrocarbons. Once a contaminant has entered the food chain, and the large organisms incorporate it into their tissues, the concentration becomes magnified. This is called biomagnification. Hence, humans and fish who are at the end of the food chain incorporate the highest levels of toxins. Fish are also extremely sensitive to alterations in water temperature, a problem associated with power plant effluent.

Disposal of sewage waste into the estuary encourages the development of photosynthesic plants, resulting in algal blooms (Weiss and Wilkes, 1974) and grasses floating on the surface. The high production of plant material cannot be utilized, so they accummulate at the bottom, leading to eutrophication. (Oxygen is depleted, producing anoxic conditions and an unhealthy appearance and smell). The fish and other organisms begin to die, as the death of the estuary begins.

Odum, et. al. (1974) have identified a portion of the Great Bay Estuary as being a sewage affected system. A study recently completed by the New Hampshire Water Supply and Pollution Control Commission (Staff Report No. 67 - "Piscataqua River and Coastal New Hampshire Basins, Water Quality Management Plan") shows large portions of the Piscataqua River, Great Bay and tributaries as having high concentrations of coliform bacteria. Coliform bacteria are pathogenic organisms associated with increased levels of domestic dumping of sewage wastes. The nearshore

coastal waters and Hampton-Seabrook Harbor are in better condition. Increased use of the Piscataqua River and Great Bay Estuary by the various industrial and municipal interests and various oil terminal operators will increase stress on the systems involved, changing their nature by altering turbidity.

Dredging is a serious threat to the estuary, as it increases sedimentation. Destruction of the grass bed results in highly turbid waters, deficient in oxygen, light and life. (Copeland and Dickens, 1974). The inflow of oil develops a special new ecosystem (McMahan, 1974), dominated by organisms that can adapt, but reducing the diversity of organisms drastically. Oil is particularly stressful to larger organisms, due to biomagnification. It is interesting to note that the most desirable species to man are usually those which are affected the most. A good example of this is polluted freshwater lakes, where the fish that overpopulate are dace, suckers, etc., i.e. the undesirables.

Clearing the adjacent land of vegetation has many detrimental effects. One is a decrease in the watershed's ability to hold back storm waters. An increase in total volume of freshwater will be delivered to the estuary also, providing unfavorable environments for species that require a certain level of salinity.

Diversions of water from the watershed, channelling rivers or clearing and surfacing of land may result in reduction of sources of dissolved nutrients to coastal waters or cause the inflow to move so quickly to sea that the ecosystem is deprived of needed nutrients. The fresh water inflow should not be altered because it may be result in a reduction of the natural supply of nutrients. Uncontrolled construction activities greatly increases the amount of sediments and contaminants carried down to the estuary with fresh water runoff. Barren soil must be stablized by replanting vegetation. Finished grades are to be designed so as to direct water flow along natural drainage courses and through natural terrain where the vegetation can cleanse runoff waters. (Clark, 1974).

It has been determined that an estuary can recover after pollution abatement, but not from extended periods of pollution (Dean and Haskin, 1964).

It must be kept in mind that if the plankton population is affected, the whole system suffers because it is dependent on the particular plankton community as the food supply basis. Any intrusion that affects the circulation, flow or bottom of the estuary will have deleterious effects.

Worm-Clam Flat

Spreading virtually throught the entire seacoast region is a general habitat known as the worm-clam flat. These areas are characterized as accumulations of silt and clay which, in the intertidal areas, form a low profile zone of particles sorted with fine fractions in the upper zone. The bottom material can be quite sandy and hence may overlap with the beach-sandy bottom category. Worm and clam flats are always in protected embayments. The flats are located in sheltered bays and estuaries, in regions of silt and detritus deposition and require a constant flow of organic matter to the sediment. New Hampshire worm-clam flats are extensively located adjacent to the Hampton-Seabrook and Rye Harbor marshes, and in tidal flat areas of the Great Bay/Little Bay estuary. (See Clams and Oysters map)

The worm-clam flat ecosystem requires benthic diatoms and dinoglagellates as the primary producers with phytoplankton and detritus contributing to the sources of energy (nutrient) flow. Nutrients pass out of the habitat as pelagic larvae, bird and fish food. Common intertidal species present in the flats include the important soft-shelled clam (Mya arenaria) and the pea clam (Gemma gemma). Typically, eelgrass and quahog clams (Mercenaria mercenaria) are found in substantial numbers. Also using worm-clay flat areas are various shore birds such as gulls, crow, sandpipers and ducks. Horseshoe crabs and flounders are also common here (See Table #3). Sandworms and bloodworms are also located in such regions, sandworms being

dug commercially in New Hampshire.

The clams activate the food web interaction by incorporating organic matter into food for birds, fish and crabs. A number of fish which utilize the estuary as a breeding and nursery area such as the striped bass, smelt and pollock obtain their food source from the clam flats. Other fish usually found here are mummichog, eel, codfish and winter flounder.

The organisms that inhabit this region have certain requirements necessary for life. If an intrusion by man upsets the nutrient balance and cycling by affecting one organism, adverse effects will extend everywhere. The result of oil infiltration into this habitat is long-lived. Oil sinks into the sediment, where the organisms live. Heavily oiled areas result in the mortality of clams and those that survive do not recover after one year observation (Sanders, et. al., 1972). Oil does not seem to concentrate in crabs, indicating that it isn't transmitted via biomagnification in the food chain. Most probably the filter feeders (clams) filter it out of the system, thereby suffering the most as they accumulate it in their systems. Minor spills are tolerable.

Dredging causes the most serious damage, as it reduces worm and clam population drastically. (Sykes and Hall, 1970). An average sample in dredged bottoms produced 1.1 individuals and .6 species, as compared with 60.5 individuals and 3.8 species in undredged areas. The study was taken in Florida, and it was mentioned that such effects would be even more severe in northern regions, due to an initial lower diversity. The clam flat is situated in a precarious position, as it requires protection but also needs a constant flow of nutrients. A shift in either direction will be damaging. Salinity and sediment type are determining factors in the distribution of this habitat, and alterations affecting these factors will destroy it. This habitat can tolerate a limited input of waste but excessive quantitites cannot

be dealt with.

Oyster-Mussel Reef

Mussel-oyster reefs are intertidal and subtidal communities based on and dominated by beds of mussels and/or oysters. They may overlap with the rocky shores community or be found among mud flat communities. A preliminary source of attachment (such as a small rock or boulder) allows initial settlement (Emery et. al., 1957). They may also be found attached to foreign objects such as pilings. Their intertidal location renders them relatively well protected from predators. In New Hampshire, locations of oyster-mussel reefs are not well documented. Some oyster reefs do exist in the Great Bay area, the Oyster River and upper stretches of the Piscataqua River. Mussels exist throughout New Hampshire coastal areas. Generally, they are common throughout embayment regions (See Clams and Oysters maps).

Oysters and mussels are filter feeding bivalves, filtering organic matter and recycling nutrients primarily from other sources such as the salt marsh. The reefs are highly productive, and an acre of mussels is thought to strain its food from 2.0 to 22,000 metric tons of water per day (Anon, 1973). Their function as cleansers of the coastal system cannot be underestimated. They are most successful with a strong current to bring in food and carry out waste. Their waste products contain valuable nutrients for burrowing species, and they are also prey for birds, fish, man, and predatory scavengers such as crabs. The reproduction of an oyster-mussel reef is primarily affected by temperature.

The shells of dead mussels or oysters serve to attract other organisms, which are fed upon by crabs, etc. The species present are similar to those found in rocky shore areas (See Table #3). If the mussels (or oysters) are located on weed flats, species found in the flats would be interspersed among them as well, which emphasizes

the degree of interdependence between the various categories of ecotypes described here. An idea of how complex even one interaction can be illustrated by this relationship: mussels filter the products of plankton systems (both open ocean and estuary) from the water and regenerate nutrients among the algal beds which return oganic matter to the plankton.

Oysters react to environmental stress by closing their valves (Laird, 1961). If conditions do not subside, they will die and the result will be the establishment of a community of bacteria and protozoa. Reefs may be smothered with silt or be scoured away when currents are altered (dredging, erection of jetties, establishment of marinas). Silt-laden waters constitute a harsh environment for their planktonic young stages, and layers of mud are an unsuitable substate. Even a thin layer of silt over an otherwise clean surface will prevent oyster larvae from attaching (Clark, 1974).

Oyster-mussel reefs are vulnerable to water-borne pollutants. Hydrocarbon pollution results in the formation of hard inclusions within the organism's body (Scattergood and Taylor, 1949). The oyster-mussel reefs are frequently located within an estuarine system. If estuarine water eutrophies the composition of the phytoplankton is altered. The oysters are likely to be unable to utilize the emergent community of phytoplankton and will vanish. Since the oysters and mussels filter the water, the eutophication process will worsen, and since the estuarine and open ocean systems are inter-related and interdependent, this will create the disruption of the entire coastal ecosystem.

High Velocity Ecosystems

Odum, et. al. (1974) has defined an ecosystem termed "high velocity". It occurs in channels where water flows at speeds from 3 to 20 miles per hour. Stretches of the Piscataqua River flow at those speeds and detailed studies of the biology

of this high velocity ecosystem have been accomplished by Normandeau Associates for the Public Service Company of New Hampshire (Normandeau et. al., 1970).

Odum, et. al. (1974) indicates that "very strong current dominates the system and allows dense patterns of attached organisms . . . . If the surface is within range of light, heavy algal growths develop . . . ." This has been documented in the Piscataqua by Normandeau Associates. (An interesting analogy is to currents in a cooling intake pipe using salt water cooling -- such as that proposed for the Seabrook Power Plant.) Also, fouling organisms on ships are characteristic of a high velocity ecosystem. Two species common to such ecosystems include the barnacle (Balanus Balanoides) and the blue mussel (Mytilus edulis). Various species of marine algae also are found in this environment.

Odum, et. al. (1974) characterize these ecosystems as being "important to man as a concentrating mechanism for food (through the feeding of such species as the barnacle and mussels), sports, waste purification, and as problems in maintaining ships, cooling pipes and inlets." No relative ranking in importance with other ecosystems has been offered, though this system does depend on other areas for its basic nutrients.

Disruption of this system would result from any alterations in current flow. Contaminants pass through this system quickly enough so that at low concentration minimal damage would be evident. As soon as the system transects another, the effects of pollution are not so predictable, as another system with its different properties may not react similarly.

Salt Marsh

The salt marsh habitat is defined as wetland areas where the emergent vegetation is composed of salt-tolerant grasses. Features also include salt pans, tidal

creeks, and the subtidal areas of soft mud adjacent to the grass areas. They occur in protected waters as a result of mud deposition, shoaling and colonization by salt tolerant grasses. The physical extent of salt marshes in New Hampshire has been determined by Breeding, et. al. (1974) to be approximately 7,500 acres, primarily in the coastal towns of Seabrook, Hampton, Hampton Falls and Rye. Other areas of salt marsh habitat are spread throughout the shores of Great Bay and its tributaries.

The salt marsh is a time-built community and requires unrestricted entry of the tidal waters as tides are the determining factor in salt marsh production. The marsh is a highly productive component for the estuary, with half of its plant tissue exported into the estuary. The habitat is widely accepted as contributing significantly to the food source of various species. TRIGOM (1973) reports that "the emergent marsh is highly productive, forming an important source of food . . . along the coast . . ." When the tide ebbs it carries nutrients out of the marsh and the nutrients are in turn utilized by shoreline and open ocean communities.

The salt marsh ecosystem is important as a spawning and nursery ground as well as a source of crustaceans and small fish for supplying larger predators. The annual value of food production for marine species has been estimated at $4,000.00 per acre. (Allan in Breeding, et. al., 1974) or an annual value in New Hampshire of around $30,000,000. Two-thirds of all fish and shellfish are dependent on the marsh-estuarine system some time in their life cycle (Clark, 1974). Twenty-six species of fish were reported as spending all or part of their lives in the Hampton-Seabrook estuary as a whole, attracted by the nutrients there. These fish range from cod, pollock and striped bass down to killifish and sand lance (Normandeau et. al., 1971). (See Table #3).

Marshes also stabilize the coastline and protect it against major flooding and storms. It comprises a necessary buffer zone, minimizing erosion and flood water

damage. Oxygen is produced and organic wastes are disposed of through primary nutrient production and are returned into the food chain. The marsh utilizes material that would ordinarily accumulate. Nutrient production of the salt marsh links the food chain among wildlife, fin and shellfish, vegetation and future food production. The grass in marshes such as Hampton-Seabrook (Spartina alterniflora and Spartina patens) used to be harvested as hay by early settlers.

The salt marsh and the adjacent mud flats supply an abundance of worms and mollusks for wintering waterfowl and shorebirds. Migrating geese and ducks rely on the marshes as resting and feeding grounds, and frequent them in their migrations, providing hunting as a popular recreational sport. The birds are relatively safe from predators, and the tall marsh grasses and other flora offers protective coloration. If the birds rested in other regions, they would be more susceptible to attack.

Besides being invaluable aesthetically, the marsh is important in purifying the water by acting as an absorbant sediment trap. The marsh removes toxic materials and excess nutrients from the interacting estuarine waters. A 1,000 acre marsh may be capable of purifying nitrogenous wastes from a town of up to 20,000 people (Clark, 1974). A study by John Teal (1974), who terms the marsh the "living filter," indicates that sewage-derived fertilization of the marsh is beneficial in that animal and plant production increased with minimal change in the marsh. This substantiates the possibility of utilizing marshes for a limited sewage dumping ground. Teal also recognizes the marsh as a "valuable seafood producer, wildlife refuge and coastal fishery nursery area." The marsh, in mechanically and chemically removing sediment and other suspended matter, reduces sedimentation of navigation channels and shellfish beds.

The vegetation of the marsh is extremely important, for without it the loose sand and peat layers would automatically erode. The spilling of oil has a major

effect on the vegetation. Oil can seep from the flats onto the salt marsh peat layers. There, it destroys the grasses underground root system (rhizomes) by preventing oxygen from diffusing to them (Thomas, 1973). Cooler regions are particularly sensitive to this type of salt marsh deterioration.

Of all the critters that inhabit the marsh, perhaps the most sensitive is the unique fiddler crab. They are the only major species which are known to be harmed by sewage waste disposal (Teal, et. al., 1974), and are also extremely sensitive to persistent pesticides. Besides the fiddler crab, blue and green crab as well as shrimp are also essential members of the marsh system.

Until recently, salt marshes were relatively safe from human intrusion. Presently, marshes are being subjected to waste disposal, dredging and oil pollution as well as destruction for commercial uses or mosquito control. Dredging and filling is unquestionably the most destructive force of intrusion by man. Permanent marsh destruction is probable and predictable. It blocks the natural tidal flow, destroys the vegetation and results in anoxic conditions. Only anaerobic species are able to survive, which is an unhealthy situation exacerbated by the hydrogen sulfide elimination - the characteristic "rotten egg" smell.

Unhealthy or polluted marshes breed mosquitos, whereas normally their population is reasonably controlled by the birds and fish that are their natural predators. Industrial waste (as opposed to sewage) is almost as detrimental as dredging, only the response is slower, and therefore less evident.

Rocky Shore Habitat

This habitat is defined as including intertidal and subtidal rock formations such as headlands, rocky ledges, outcroppings, boulders and pilings. All shores washed by saline waters or wetted by spray to 20 meters depth with a rock substrate can be considered rocky. In New Hampshire, such areas as Boar's Head, Little Boar's

Head, Odiorne Point, Rye Ledge, and portions of the New Castle coast would be included in this category. Various submerged areas, particularly in the area between Rye and the Isles of Shoals are included as well.

These areas are characterized as having high natural value. Dominating plants are kelp, irish moss and rockweed which attach to hard stationary surfaces. They are important because they are the producers which are exported to become the basis of the food chain in other habitats (pelagic, worm and clam flats, sandy shores). Rocky shores contribute to the production, consumption and cycling of estuary components. Species such as lobsters, crabs, mussels and periwinkles frequent this habitat, making it a productive source of food for people as well. It serves as a resource with potential for greater use of algal beds, mussels, crustaceans and fish trapping that move into these rock beds with the tide (Odum, et. al. (1974).

The scenic and recreational value of rocky shores to man increases their value. Perhaps most important is their function as a natural barrier for breaking waves, and a protective barrier against storm waves and erosion of the land. The breaking waves against the rocks also supply beneficial aeration of the ocean water. Rocks stabilize the New Hampshire shoreline and the rocky shore community is a unique one, with long-lived organisms, high competition and simple interactions. For example, urchins are destructive grazers of the kelp bed, and their population is controlled by lobsters that prey on them. Hence, the significance of the lobster and the consequence of drastically reducing its population. Symbiotic relationships exist between the sessile (attached) organisms. The barnacles with the sweeping motion of their feathery feet help to cleanse the systems by removing the particulates in the water. The sessile organisms eliminate nutrients which in turn are utilized by others as an important food source (See Table #3).

Sensitivities to man induced stress are relatively low in this environment,

especially under minor disturbances. Minor oil concentrations are not entirely deleterious but heavily oiled sites are completely harmful. Sewage outfall in the immediate area results in total elimination of all the species there (Borowitzka, 1972). Removal or disruption of the rock formation would result in erosion of the land and elimination of the life that inhabit it. The disturbance inflicted, whether it be a pollutant or excessive foot traffic, will be felt as soon as the most sensitive organism responds, as one organism effects the entire food web. One of the principal destructive effects is that the sessile organisms lose the ability to attach themselves to the rocks, and fall off under pollutant invasion of the water, such as dredging spoils or oil spills. The effects of pollution are amplified by the fact that water borne contaminants may settle into the rock crannies and be ingested by the organisms to be passed into the food chain.

Sandy Beach/Shore

This area includes beaches at the shoreline on out to the limit of effective light penetration for photosynthesis and effective wave action (about 20 to 110 feet in depth). Zonation of this ecosystem would include subtidal, intertidal and upper tidal regions, as well as a berm and a dune strand. In New Hampshire, 70 per cent of the coastline is beach, comprising the Seabrook Beach, Hampton Beach State Park, North Beach, Wallis Sands and similar areas such as Rye Beach. Hampton Beach is actually a barrier island, subject to erosion at the north face and deposition of sand at southern portions due to the action of the sublittoral current. Overwash during the high seas is characteristic of such shores, which functions to build the dune system.

The sandy beach ecosystem is the least productive marine habitat. The environment is quite harsh, and the animals that inhabit it (usually burrowing types according to Clark, 1974) can withstand high stress due their adaption to intense natural stress. This makes the beach portions of the shore (not the dunes)

particularly adaptable to recreational use. Various species associated with the habitat include sand worms, surf clams, hermit and horseshoe crabs, sand dollars, starfish, scallops and striped bass. Birds such as gulls, terns, sandpipers and dowitchers also frequent this habitat (See Table #3).

The sand dunes associated with this environment have a high natural value in the protection of the marshes located behind (Hampton-Seabrook for example). Beaches are recreationally and commercially valuable, but a beach cannot exist alone. The dunes behind it are naturally occurring products of wind and wave action. They perform a protective function which is quite expensive to duplicate. The dunes also function to build the beach as they store sand to replace that eroded by waves, thereby providing long term stability to the shorefront (Clark, 1974). It makes economic sense, as well as environmental sense, to preserve the dunes.

It should be noted that in only one or two spots along New Hampshire's coast do dunes exist in relatively natural form, at Seabrook and (possibly) at Odiorne's Point State Park. The Hampton dune system has been replaced by a recreational complex, and several areas along the coast are diked to provide the function dunes usually perform. The barricades along the coast are not only inadequate, unappealing, and do not solve the problem, but actually increase the risk of property destruction relative to the protection afforded by a stabilized dune system.

Vegetation on the dunes (beach grass, wormwood, dusty miller, rose and seaside goldenrod to name a few (Petry, 1968) impede sand movement in the dunes' receding inland movement. If the vegetation is destroyed, the dune's movement is accelerated, resulting in erosion. The vegetation often yields beautiful flowers, aesthetically pleasing as well as attracting other species to the habitat.

Dunes are especially necessary to barrier islands, as they offer the only means of stability, absorbing the brunt of the physical forces. Also, portions of the

dune and the berm serve as nesting areas for shore birds. Heavy foot traffic disturbs the nesting habitat, disrupting reproduction.

Seawalls and bulkheads do not provide the effective protection against inundation of seawater a natural dune system affords and, if improperly placed, will often increase beach erosion with resultant collapse of shoreside buildings. Jetties cause accumulation of sand at one end and erosion at the other.

The beach front is a constantly changing environment and is by no means permanent, and permanent structures located there require consistent expenditures for protection and maintenance. Behind the shifting dunes are stable dunes which consist of more permanent surroundings typified by deciduous growth. Buildings are relatively safe in this region and beyond.

The beach front is quite resistant to oil pollution and other contaminants. Sewage waste would be unnacceptable hygienically due to bathers in the water. The most dangerous situation arises with destruction of the dune strand. Improperly located boadways lead to deterioration of the dunes, and should always run perpendicular rather than parallel to the shoreline.

Natural forces are unpredictable and uncontrollable. It makes sense to utilize nature's intrinsic means of conservation to allow long-term appreciation and benefit from the dynamic shore.

Coastal and Open Water Pelagic System

Here we are concerned with the plankton based pelagic habitat. It ranges in geographic location from the coastal estuaries to deep ocean areas beyond the Gulf of Maine. This makes the pelagic habitat the most widespread of habitats occurring in New Hampshire's coastal zone, as it is overlayed to a greater or lesser degree on all others present. In this coastal and open ocean habitat larvae of Atlantic herring,

silver hake, and Atlantic salmon have been included in the selected species list (Moore et. al., 1974). Other fish that are found here are menhaden, dogfish, smelt, bluefish, mackerel, tuna and (rarely) salmon. References to the Final Environmental Statement - Seabrook Units 1 and 2 reveals a number of planktonic forms of well known species existing in the Hampton-Seabrook area (See Tables #3 and #4). Larvae of the softshelled clam, surf clam and pea clam have been reported. A wide range of fish larvae, including yellowtail flounder, mackerel, pollock and cod have been encountered by Normandeau, et. al. (1974) in their studies of the environmental impact of the Seabrook nuclear power plant.

The most important aspect of this ecotype is the photosynthetic production of the phytoplankton. The pelagic habitat has a relatively complicated food web. The coastal plankton system is the principal location of commercial and sport fishing and the plankton play a significant role in the food cycle of hake, cod, pollock, swordfish and herring. Phytoplankton form the essential basis of the entire food chain, upon which everything else depends, converting energy to food and oxygenating the system. The open ocean supports migrating species which interrelate with the estuarine habitat in reproductive cycles. The open and coastal ocean also provides a "buffer" between deep systems and the highly productive estuaries.

Adaptions to this environment are less intense than in more variable coastal regions. Coastal and inland portions of this habitat are under stress primarily due to increasing encroachment by man. Activities which increase water turbidity (dredging) are the greatest single threat to coastal waters, decreasing light penetration thereby decreasing oxygen concentration and photosynthesis. The entire food chain suffers.

Sensitivity to temperature changes in felt by fish larvae, zooplankton and copepods (which are prey for fish). Hot water effluents can be extremely detrimental. The controversy over the effect of entrainment of clam larvae by the proposed Seabrook

Power Plant typifies such problems. If the larvae killed are from the Hampton-Seabrook area alone, a decrease in clam population will be detectable locally. If the larvae are part of an essentially "infinite" system, there will be no noticeable decrease in clam population in the area.

The pelagic habitat, with its complicated food web, may escape moderate levels of contamination. An excess of nutrient input is detrimental. The problem of encroachment enters as the highly productive marshes are under increasing pressure for development, incrementally reducing the extent of naturally productive areas. This can only contribute to a decrease in the vitality of the pelagic ecosystem (highly valuable as a food source). The problem is exacerbated by the fact that estuarine and marsh areas are not limitless either in New Hampshire or elsewhere. New coastal activities may have a serious effect on these systems either directly, if they are large enough, or through incremental changes in nutrient-producing areas of the coastal zone.

Effects of new activities on the coastal and nearshore open water systems are subject to debate, however, as the obviously limited estuaries are no longer the primary impact area. The open water pelagic habitat is much more extensive and there appears to be a popular feeling that the resource is essentially infinite -- that no one action will have a noticeable effect, due to the extent of area affected and quantity of life it contains. Associations with the more vulnerable inland systems are incompletely known, however, and in selected cases the effects may manifest themselves much more noticeably than first thought, especially when one realizes that a number of migrating species use both coastal and inland habitats at various stages of their lives, or are carried back and forth by the current.

Offshore Bottom Habitat

On a regional basis, the offshore bottom habitat is the most extensive, comprising an area greater than all other habitats combined, except for the pelagic

habitat. Bottom characteristics are highly variable, but generally one can characterize topographic highs such as Jeffrey's Ledge as being of hard substrate, and adjacent lows such as Jeffrey's Basin or Scantum Basin of the softer muds and mud sand mixtures. Soft substrates (mostly sand) are also located adjacent to sandy beaches and in pockets throughout the immediate nearshore area.

Two subdivisions of species exist: those that inhabit the surface and those that burrow into it. Data on community interrelationships in this system are sparse. Species may be grouped, however according to the bottom type in which they live. The following sediment types are thought to harbor different species:

Soft
1) Mud
2) Sand
3) Mixture of mud, sand and shell

Hard
4) Gravel
5) Bedrock outcropping
6) Rocks and cobbles

The biota is dependent on debris and detritus originating outside the habitat. Species living on the soft-bottomed areas include the commercially important mahogany quahog, the surf clam, the sea scallop and the lobster. (See Table #3). This habitat also supports a variety of detritavores which feed on organic material on the bottom as detritus and are in turn fed upon by haddock, cod, pollock and other commercially valuable groundfish. Hard bottom species are present over relatively large masses of favorable habitat or in such limited places as abandoned clam shells. Many of the species which live in this habitat are very tiny, and will often attach themselves to the bottom in what appear to be sheets. These species filter organic matter out of the water and are fed upon by larger and more easily recognizable types including starfish, lobster, and groundfish such as haddock and cod.

The chief importance of this ecosystem to man appears to lie in its support of commercially caught marine species, such as lobster, various species of groundfish, and a number of commercial shellfish. Many of the species dwelling in the level bottom habitat aid in the overall function of the marine environment by the recycling of organic matter, which would otherwise be lost, out of the food chain.

Phosphorous and nitrogen appear to be the limiting factors in this environment, as they are usually in a relatively low concentration (Hobbie, 1974). But increased quantities have led to different species that adapt favorably to becoming the most significant members, out-competing commercially important species. An increase of phosphorus and nitrogen (household wastes and sewage) tends to lead to deep water anaerobic layers. Aerobic organisms die, and recycling slows down as excess matter accumulates. This is not a common occurrence to open ocean systems, however.

Heavy metal wastes would render the sediment containing the benthic organisms toxic to settling larvae, and would depress productivity. Sewage and dredging spoil increase the organic content of the sediment and would lower the oxygen supply of overlying waters. Since most of the organisms in the habitat are bottom feeders, any alteration in the sediment population would be unfavorable. An increase in turbidity would alter the balance between suspension feeders and deposition feeders toward the latter in many communities, decreasing the bottom fish catch. Bottom feeders include cod, haddock, hake, flounder and scup (See Table #4).

SUMMARY

Environmental management of the coastal zone must have as one of its fundamental goals the maintenance of coastal ecosystems in their best condition. It is often advantageous both economically and ecologically to maintain the coastal ecosystems at the level of the best achievable ecosystem function, or as near to the natural

state as possible. An important thing to remember is that the introduction of new coastal uses by man will result in a corresponding adaption of existing ecological systems - a change in lifeforms found there. There is no reason to assume that all changes will necessarily be detrimental, or that they are not manageable. Fish farming in the heated effluent of a power plant, for example, is being considered today. Given the complexity of the interactions demonstrated here, however, it is best to proceed with some caution and foreknowledge of likely effects of one's actions.

Table 1

OCCURRENCE OF IMPORTANT MIGRATORY FISHES

IN GREAT BAY ESTUARY

SPECIES	COMMON NAME	ADULT	JUVENILES
Alosa aestivalis	Blueback herring	April-June	May-Oct
Alosa pseudoharengus	Alewife	April-July	May-Oct
Brevoortia tyrannus	Atlantic menhaden	July-Sept	July-Oct
Osmerus mordax	Rainbow smelt	Oct-June	April-Nov
Pollachius virens	Pollock	July-Nov	April-June
Morone saxatilis	Striped bass	May-Nov	
Scomber scombrus	Atlantic mackerel	July-Oct	
Gadus morhua	Atlantic cod	March-June Oct & Dec	
Oncorhynchus kisutch	Coho salmon	Aug-April	April-Sept (Oct)

Source: Stevenson, et. al. (1974)

Table 2

SPECIES OF FINFISH IN GREAT BAY ESTUARY

SCIENTIFIC NAME	COMMON NAME	RESIDENT	MIGRATORY	DEMERSAL EGG SPAWNERS
Anguilla rostrata	American eel	✓	✓	
Alosa aestivalis	Blueback herring		✓	✓
Alosa pseudoharengus	Alewife		✓	✓
Clupea harengus harengus	Atlantic herring		✓	✓
Osmerus mordax	Rainbow smelt		✓	✓
Microgadus tomcod	Atlantic tomcod	✓		✓
Pollachius virens	Pollock		✓	
Urophycis chuss	Red hake		✓	
Urophycis tenuis	White hake		✓	
Fundulus heteroclitus	Mummichog	✓		✓
Fundulus majalis	Striped killifish	✓		✓
Menidia menidia	Atlantic silverside	✓		✓
Apeltes quadracus	Fourspine stickleback	✓		
Gasterosteus aculeatus	Threespine stickleback	✓		
Pungitius pungitius	Ninespine stickleback	✓		
Syngnathus fuscus	Northern pipefish	✓		
Tautogolabrus adspersus	Cunner	✓		
Pholis gunnellus	Rock gunnel	✓		
Ammodytes americanus	American sand launce	✓		✓
Myoxocephalus aenaeus	Grubby	✓		✓
Cyclopterus lumpus	Lumpfish	✓		✓
Liopsetta putnami	Smooth flounder	✓		
Pseudopleuronectes americanus	Winter flounder	✓		✓
Morone saxatilis	Striped bass		✓	
Morone americanus	White perch	✓		✓
Monocanthus hispidus	Planehead filefish		✓	
Stenotomus chrysops	Scup		✓	
Tautoga onitis	Tautog	✓		
Raja erinacea	Little skate	✓		
Petromyzon marinus	Sea lamprey		✓	
Cryptacanthodes maculatus	Wrymouth		✓	
Scomber scombrus	Atlantic mackerel		✓	
Gadus morhua	Atlantic cod		✓	
Oncorhynchus kisutch	Coho salmon		✓	
Sphoeroides maculatus	Northern puffer	✓		✓
Lophius americanus	Goosefish	✓		
Salmo trutta	Brown trout		✓	
Brevoortia tyrannus	Atlantic menhaden		✓	
Myoxocephalus octodecim-spinosus	Longhorn sculpin	✓		✓
Hemitripterus americanus	Sea raven	✓		✓
Pomatomus saltatrix	Bluefish		✓	

Source: Stevenson, et. al. (1974)

TABLE 3 Selected Species for
Bay of Fundy to Cape Cod

PELAGIC	
Ceratium spp.	dinoflagellate
Chaetoceros spp.	diatom
Thalassiosira spp.	diatom
Pleurobrachia pileus	ctenophore
Calanus finmarchicus	copepod
Pseudocalanus minutus	copepod
Oithona similis	copepod
Microsetella norvegica	copepod
Eucheata norvegica	copepod
Acartia spp.	copepod
Tortanus discaudatus	copepod
Evadne nordmanni	cladoceran
Meganyctiphanes norvegica	euphausid shrimp
Sagitta elegans	arroworm
Limacina retroversa	sea butterfly
Polychaete, mollusca, and decapod larvae	
Fish larvae	
Clupea harengus	herring
Merluccius bilinearis	silver hake
Salmo salar	atlantic salmon
Plautus alle	dovekie
Rissa tridactyla	kittiwake
OFFSHORE BOTTOM	
Aurelia aurita	coelenterate
Nepthys incisa	polychaete worm
Nucula proxima	clam
Arctica islandica	mahogany quahog
Spisula solidissima	surf clam
Placopecten magellanicus	sea scallop
Ampelisca vadorum	amphipod
Homarus americanus	lobster
Pandulus borealis	northern shrimp
Ophiura robusta	brittle star
Gadus morhua	cod
Pseudopleuronectes americanus	winter flounder
ROCKY SHORE	
Ascophyllum nodosum	rock-weed algae
Laminaria spp.	kelp
Metridium dianthus	sea anemone
Thais lapillus	dog whelk
Mytilis edulis	mussel
Littorina littorea	periwinkle
Balanus balanoides	barnacle
Homarus americanus	lobster
Strongylocentrotus droebachiensis	sea urchin
Somateria spectabilis	eider duck

SOURCE: Moore, et. al. (1974)

TABLE 3 (Cont'd)

SAND SHORE

Nephthys caeca	sand worm
Tellina agilis	clam
Spisula solidissima	surf clam
Pagurus longicarpus	hermit crab
Haustorius canadensis	amphipod
Echinarachnius parma	sand dollar
Ammodytes americanus	sand launce

WORM and CLAM FLAT

Nereis virens	sand worm
Arenicola marina	lugworm
Streblospio benedicti	polychaete worm
Glycera dibranchiata	blood worm
Mya arenaria	soft clam
Polynices heros	snail
Nassarius obsoletus	snail
Macoma balthica	clam
Mercenaria mercenaria	quahog or hard clam
Corophium volutator	amphipod
Crangon septemspinosus	mud shrimp
Limulus polyphemus	horseshoe crab

MUSSEL REEFS

Harmothoe imbricata	polychaete worm
Harmothoe extenuata	polychaete worm
Crassostrea virginica	virginia oyster
Mytilus edulis	edible mussel
Crepidula fornicata	slipper shell
Asterias vulgaris	starfish
Asterias forbesi	starfish

SALT MARSH

Spartina alterniflora	marsh grass
Clymenella torquata	polychaete worm
Melampus bidentatus	snail
Orchestiidae	amphipod
Crangon septemspinosus	mud shrimp
Diptera larvae	
(Aedes sollicitans)	mosquitoes
(Chironomus spp.*)*	flies
Fundulus heteroclitus	mummichog
Pseudopleuronectes americanus	winter flounder
Ammospiza leconteii	sharptail-sparrow

TABLE 4

SPECIES TAKEN IN FISHERY SURVEYS FROM CAPE COD NORTH TO THE ISLES OF SHOALS

		Hampton-Seabrook	Isles of Shoals	Northern Mass.
Alewife	Alosa pseudoharengus	x	x	x
American eel	Anguilla rostrata	x	x	x
American plaice (dab)	Hippoglossoides platessoides	x	x	
American sand launce	Ammodytes americanus	x	x	x
American shad	Alosa sapidissima		x	
Atlantic cod	Gadis morhua	x	x	x
Atlantic halibut	Hippoglossus hippoglossus	x		
Atlantic herring	Clupea harengus	x	x	x
Atlantic mackerel	Scomber scombrus	x	x	x
Atlantic menhaden	Brevoortia tyrannus	x		x
Atlantic silverside	Menidia menidia	x		x
Atlantic spiny lumpsucker	Eumicrostomus spinosus			x
Atlantic sturgeon	Acipenser oxyrhincus	x		
Atlantic tomcod	Microgadus tomcod	x		x
Atlantic torpedo	Torpedo nobiliana			x
Atlantic wolffish	Anarhichus lupus	x	x	x
Banded rudderfish	Seriola zonata	x		x
Barndoor skate	Raja laevis	x	x	x
Barrelfish	Hyperglyphe perciformis			x
Black sea bass	Centropristos striata	x		x
Blackspotted stickleback	Gasterosteus wheatlandi	x		x
Blue hake	Antimora rostrata		x	
Blue runner	Caranx crysos			x
Blueback herring	Alosa aestivalis	x	x	x
Bluefish	Pomatomus saltatrix	x		x
Butterfish	Peprilus triacanthus		x	
Chub mackerel	Scomber japonicus			x
Clearnose skate	Raja eglanteria		x	
Conger eel	Conger oceanica			x
Crevelle jack	Caranx hippos			x
Cunner	Tautogolabrus adspersus	x	x	x
Cusk	Brosme brosme		x	
Daubed shanny	Lumpenus maculatus		x	
Fluke	Paralicthys dentatus	x		
Fourbeard rockling	Enchelyopus cimbrius	x	x	x
Fourspine stickleback	Apeltes quadracus	x		x
Fourspot flounder	Paralichthys oblongus		x	x
Goosefish	Lophius americanus	x	x	x
Grubby	Myoxocephalus aeneus	x	x	x
Haddock	Melanogrammus aeglefinis	x	x	x
Hickory shad	Alosa mediocris		x	
Little skate	Raja erinacea	x	x	x
Longhorn sculpin	Myoxocephalus octodecimspinosus	x	x	x
Lumpfish	Cyclopterus lumpus	x	x	x
Mackerel scad	Decapterus macarellus			x
Mummichog	Fundulus heteroclitus	x	x	x
Ninespine stickleback	Pungitus pungitus	x		x

TABLE 4
(continued)

		Hampton-Seabrook	Isles of Shoals	Northern Mass.
Northern kingfish	Menticirrhus saxatilis			x
Northern pipefish	Syngnathus fuscus	x		x
Northern puffer	Sphaeroides maculatus			x
Northern searobin	Prionotus carolinus	x		x
Ocean pout	Macrozoarces americanus	x	x	x
Ocean sunfish	Mola mola			x
Pollock	Pollachius virens	x	x	x
Radiated shanny	Ulvaria subbifurcata	x	x	x
Rainbow smelt	Osmerus mordax	x		x
Red hake	Urophycis chuss	x	x	x
Redfish (or rosefish)	Sebastes marinus	x	x	
Rock gunnel	Pholis gunnellus	x	x	x
Scup	Stenotomus chrysops	x		x
Sea lamprey	Petromyzon marinus			x
Sea raven	Hemitripterus americanus	x	x	x
Seasnail	Liparis atlanticus	x	x	x
Shorthorn sculpin	Myoxocephalus scorpius	x	x	x
Silver hake	Merluccius bilinearis	x	x	x
Smooth dogfish	Mustelus canis	x		x
Smooth flounder	Liopsetta putnami	x		
Snake blenny	Lumpenus lumpretaeformis	x	x	
Spiny dogfish	Squalus acanthias	x	x	x
Striped anchovy	Anchoa hepsetus			x
Striped bass	Morone saxatilis	x		x
Striped killifish	Fundulus majalis	x	x	
Striped searobin	Prionotus evolans			x
Tautog	Tautoga onitis	x	x	x
Thorny skate	Raja radiata		x	
Threespine stickleback	Gasterosteus aculeatus	x	x	x
White hake	Urophycis tenuis	x	x	x
White perch	Morone americanus	x		x
Windowpane flounder	Scophthalmus aquosus	x	x	x
Winter flounder	Pseudopleuronectos americanus	x	x	x
Winter skate	Raja ocellata		x	
Witch flounder	Glyptocephalus cynoglossus	x	x	
Yellowtail flounder	Limanda ferruginea	x	x	x

Sources: TRIGOM (1974)
NORMANDEAU ASSOCIATES (1974)

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W.P.

WATER USES

INVENTORY

An inventory of industrial, commercial, and recreational uses of the coastal waters of New Hampshire has been undertaken as part of the state's Coastal Zone Management planning effort. The ultimate objective of the study is to develop an understanding of the nature and extent of the existing use and potential uses of New Hampshire's coastal waters in order to determine what land and water uses having a direct and significant impact on coastal waters should be permitted or prohibited. The information obtained during this phase of the study is also being used to designate geographic areas of particular concern. These areas include: 1) areas of significant natural value or importance; 2) transitional or intensity developed areas where reclamation, restoration, public access and other actions are especially needed; 3) areas especially suited for intensive use or development.

The offshore planning area chosen for investigation corresponds to that shown on the nautical chart Coast & Geodetic Survey 1206 (NOS. 13113). This encompasses an offshore area approximately 40 miles long by 40 miles wide, all contained within the Gulf of Maine, and includes the area from Cape Ann to a point in Maine just north of Portsmouth Harbor, and from the New Hampshire coastline east to Jeffrey's Ledge. All New Hampshire-based near-shore marine activities and most of those further off-shore are examined, as well as many of those based in the neighboring areas of Maine and Massachusetts.

Inventories of uses in the Great Bay and Hampton-Seabrook estuaries, the Piscataqua River, and various other locations in the New Hampshire coastal zone were also conducted. The planning area for these studies coincides with that chosen for the land-use and natural resources inventory portion of the New Hampshire coastal Zone Study. Activities in these areas will typically have a more geographically limited effect than those activities which occur

offshore (the ocean waters are no respectors of state or local boundaries). Estuarine information is presented on maps derived from United State Geological Survey 7½ minute series quadrangle maps.

In assessing the "nature and extent" of the marine and estuarine uses of New Hampshire waters, a number of factors are considered. Generally, the effects of these uses on each other, and on coastal land use, are taken into account. Some of the factors which will be considered at various times during the inventory process include economic factors (i.e. monetary factors, such as wage and salary levels, transfer payments, such as unemployment compensation, tax levels, commodity prices, and changes in regional income), natural resource factors (i.e. effects on various coastal habitats in New Hampshire and on breeding and nursery areas for marine and estuarine species), and social factors (i.e. effects on state and local objectives for the future uses of the coastal zone, access to public facilities for recreation, quality of public health and welfare facilities and services, etc.). It should be understood that this first inventory is only intended to identify existing and potential uses and obtain a quite generalized view of the above factors. Specific studies with detailed considerations are scattered in their coverage and a full comprehensive data gathering effort was not feasible in this fiscal year given the time and money available. It is anticipated that future work will result in amplification of much of the following information.

EXISTING USES

Current activity off the coast of New Hampshire is not at such high levels that serious conflicts result because of demands for a limited amount of ocean space. Future uses of sufficiently large scale, such as sand and gravel dredging, or a deep water port facility could change this situation.

The New Hampshire coastal waters are presently used for a variety of activities. Among them are: domestic commercial fishing and lobstering, foreign commercial fishing, recreational fishing and boating, ocean shipping, national defense, cable areas, and research and education. These activities will be briefly discussed in order to give an indication of their intensity and what resources they demand, and to give a broad indication of their relationship to coastal land use and the various economic, social, and natural resource factors under study.

DOMESTIC COMMERCIAL FISHING AND LOBSTERING

Fishing and lobstering by U.S. boats takes place within the entire study area. Approximately 90% of the New Hampshire lobstering activity occurs within ten miles of the seacoast, predominantly in waters less than 100 feet deep. This is shown as a five to ten mile wide area on the Marine Uses map which accompanies this report. Lobstering occurs throughout that area, with heavier effort in areas of irregular or rocky bottom. Lobsters are also caught in scattered spots located further offshore. Some of this catch is intentional, and some is incidental to dragging activities. These areas are shown on both the Marine Uses map and the Offshore Fishing Areas map, which also shows other areas of importance to New Hampshire fishermen, including such fishing sites as Old Scantum, New Scantum, and the area generally southeast of the Isle of Shoals.

In 1973, the National Marine Fisheries Service estimated that New Hampshire had a total of 497 full and part-time commercial fisherman, of whom 72 fished on a full-time basis. New Hampshire Department of Fish and Game licensing reports for the same year revealed 261 lobster licenses issued for commercial purposes (full and part-time). (There were 102 recreational, or five lobster pot licenses issued.) Other commercial fishermen were involved in shrimp net

trawling, gill net fishing (predominantly for cod and pollock) and handlining or longlining, among other methods. A number of fisherman convert to and from lobstering during the year. More detailed breakdowns could not be obtained.

Commercial finfishing activity off the New Hampshire seacoast complements the lobstering activity geographically, with major activities beginning just seaward of the areas most heavily trapped for lobster, due in part to state laws (RSA 211:49) which forbid certain dragging activities within 2 miles of shore. The heaviest fishing activity is located about twenty miles off the coast, in the vicinity of Jeffrey's Ledge. Commercially important species include cod, herring, pollock, redfish, shrimp, and silver hake (whiting). The total catch of these species off the New Hampshire coast that were landed in Portland and Gloucester in 1973, was about 8.8 million pounds, according to NMFS data. That year, New Hampshire landings of these species totalled 1.4 million pounds. Landings in Portland and Gloucester are from boats based in Maine and Massachusetts, as well as in New Hampshire. Data on catch in this area by New Hampshire boats alone is not available, though their relative contribution is thought to be significant.

In order to estimate the economic importance of fisheries in the offshore area, unpublished data from the National Marine Fisheries Service has been analyzed. These data detail reported commercial fishing activity off the New Hampshire coast only and identify important commercial species, the locale where caught, and their gross landed value. Similar data pertaining to commercial catch in the Great Bay is not collected as such and is not available from the National Marine Fisheries Service. The New Hampshire Department of Fish and Game was unable to provide more detailed data for Great Bay. Consequently, this report deals only with commercial catch off the New Hampshire coast.

The activity off New Hampshire's coast is not confined solely to that of New Hampshire-based fishermen, though they take the majority of the lobster catch. Landings of finfish are made principally in Gloucester and Portland, though some caught by locally based operators are landed in New Hampshire.

NMFS data estimate of the finfish and shrimp caught within 100 square mile grids off of the New Hampshire coast has been gathered mostly by interviews at Gloucester and Portland and relies on the cooperation of the fishermen questioned as well as their subjective estimates of how much of each species was caught and where. Additionally, not all boats landing fish in these ports can be interviewed by NMFS personnel.* It is thus subject to considerable error. Because of these error sources, NMFS estimates reported catch data to be low by as much as a factor of two. The problem is especially acute for fish caught off the New Hampshire coast, principally because of the relatively small number of vessel owners viewed during the course of a year. This small sample size introduces a wide variance into the results, as one or two additional interviews may change the nature of the data entirely.

It is important to realize that interviews in Gloucester and Portland are generally conducted in the morning and are geared to the arrival of larger and more far ranging vessels which fish the Georges Bank and Nova Scotia areas. The smaller coastal vessels, which comprise the bulk of the fleet operating off New Hampshire arrive primarily in the afternoon and are not interviewed as frequently. Estimates of landings in New Hampshire, including lobsters (not listed in the Portland and Gloucester landings) are based on even less frequent interviews and are only summarized annually. They rely primarily on the judgment of the interviewees and subjective evaluation by NMFS personnel.

*Oral Communication, National Marine Fisheries Service, Woods Hole, MA, 8/74.

A survey of catch data reveals the commercial catch directly adjacent to the New Hampshire seacoast consists primarily of lobster. Further offshore, cod, pollock, silver hake, shrimp and herring are caught. A number of other species (haddock, redfish, flounders) are caught in less significant numbers throughout the area. See the Offshore Fisheries map for a detailed breakdown. The major commercial species caught also spawn in or near New Hampshire waters. See the Spawning Areas map.

Table 1 contains a listing of the yearly reported catch in pounds of the prominent commercial species. In deriving these figures, the assumption was made that all fish reported as landed in New Hampshire (See Table 2) were caught in the study area.

The value of all fish reported as caught off New Hampshire and landed at Portland or Gloucester is summarized in Table 3. The values were obtained by applying the per pound landed value of catch for each of the years indicated to the estimated value of landings. Addendum 1 to this report provides the methodology used in deriving these figures. Table 3 reflects an approximate estimate of the actual value of catch in the same area making allowance for NMFS's assumption that reported landings are low by a factor of two. (Reasons for this assumption have been presented earlier.) Table 3 shows the real value of fish caught off the New Hampshire coast to have increased from just above $500,000 in 1971 to almost $1,400,000 in 1973.

The values shown in Table 3 correspond to the catch in the entire study area. The area of most greatest potential use for other activities (e.g. recreational fishing and boating, shipping, etc.) and therefore of primary concern is a broad band approximately 10 miles out from the New Hampshire coast. This area is roughly equivalent to 1, 2, 5, 6, & 7 on the Commercial Fisheries map. The estimated value of lands at Gloucester and Portland for these areas are summarized in Table 4.

TABLE 1

IMPORTANT SPECIES CAUGHT OFF OF NEW HAMPSHIRE[1]

SPECIES	1971	1972[2]	1973[2]
COD[3]	459,300	285,100	102,400
HERRING	3,023,000	5,797,100	5,377,400
POLLOCK	200,600	606,700	135,800
REDFISH	226,000	147,600	43,300
SHRIMP[3]	358,700	806,600	1,485,000
SILVER HAKE	1,579,100	796,000	1,693,900
LOBSTERS[3] [4]	667,000	---	---

[1] Vicinity C & GS Chart 1206. (See Offshore Fisheries map)

[2] No data for New Hampshire landings in these years.

[3] Fished heavily by New Hampshire vessels. (See Marine Uses Map)

[4] New Hampshire landings only.

TABLE 2

NEW ENGLAND FISHERIES

LANDINGS BY STATES, 1971

SPECIES	MAINE		NEW HAMPSHIRE		MASSACHUSETTS	
FISH	THOUSAND POUNDS	THOUSAND DOLLARS	THOUSAND POUNDS	THOUSAND DOLLARS	THOUSAND POUNDS	THOUSAND DOLLARS
ALEWIVES	1,954	46	25	1	222	4
ANGLERFISH	-	-	-	-	143	8
BLUEFISH	-	-	2	(1)	272	34
BONITO	-	-	-	-	13	2
BUTTERFISH	-	-	-	-	70	6
COD	4,379	335	201	30	46,554	5,729
CUSK	309	24	2	(1)	1,490	136
EELS:						
COMMON	54	15	7	2	77	23
CONGER	-	-	-	-	(1)	(1)
FLOUNDERS:						
BLACKBACK	146	12	7	1	14,542	2,351
DAB	510	49	5	(1)	4,211	626
FLUKE	-	-	-	-	89	38
GRAY SOLE	514	57	4	1	5,533	935
LEMON SOLE	1	(1)	-	-	2,633	701
YELLOWTAIL	87	9	53	6	41,940	6,889
TOTAL FLOUNDERS	1,258	127	69	8	68,948	11,540
HADDOCK	821	180	19	5	20,345	5,324
HAKE:						
RED	-	-	-	-	807	41
WHITE	1,972	107	2	(1)	3,564	228
HALIBUT	77	37	1	1	167	121
HERRING, SEA	28,572	687	-	-	43,354	727
LAUNCE	-	-	21	5	12	4
MACKEREL, ATLANTIC	225	14	3	(1)	3,117	147
MENHADEN	-	-	-	-	6,312	117
OCEAN PERCH	46,630	2,347	12	(1)	13,340	700
POLLOCK	890	55	2	(1)	9,960	773
SCUP OR PORGY	-	-	-	-	564	203
SEA BASS	-	-	-	-	19	12
SEA TROUT OR WEAKFISH, GRAY	-	-	-	-	(1)	(1)
SHARKS:						
GRAYFISH	-	-	-	-	1	(1)
UNCLASSIFIED	(1)	(1)	-	-	5	(1)
SKATES	-	-	-	-	137	9
SMELT	78	18	51	21	3	2
STRIPED BASS	-	-	15	4	749	199
STURGEON, COMMON	1	(1)	(1)	(1)	2	(1)
SWORDFISH	-	-	-	-	73	71
TAUTOG	-	-	-	-	25	1
TILEFISH	-	-	-	-	1	(1)
TUNA:						
BLUEFIN	136	13	32	2	2,924	469
SKIPJACK	-	-	-	-	354	54
UNCLASSIFIED	-	-	-	-	110	9
TOTAL TUNA	136	13	32	2	3,388	532
TURBOT	-	-	-	-	23	5
WHITE PERCH	-	-	-	-	2	(1)
WHITING	9,900	480	15	1	15,077	888
WOLFFISH	14	1	-	-	585	40
UNCLASSIFIED:						
FOR FOOD	601	45	7	1	4,959	568
FOR BAIT, REDUCTION, AND ANIMAL FOOD	131	3	2	(1)	8,647	142
TOTAL FISH	98,002	4,534	488	81	253,027	28,336
SHELLFISH ET AL.						
CRABS:						
GREEN	-	-	35	5	-	-
ROCK	790	52	18	1	82	7
TOTAL CRABS	790	52	53	6	82	7
LOBSTERS, AMERICAN	17,556	17,481	667	741	6,146	6,894
SHRIMP	18,419	3,671	112	18	6,005	964
CLAMS:						
HARD:						
PUBLIC	6	8	-	-	678	992
PRIVATE	-	-	-	-	297	329
OCEAN QUAHOG	-	-	-	-	5	2
RAZOR	-	-	-	-	2	2
SOFT:						
PUBLIC	5,250	2,694	-	-	1,137	968
PRIVATE	-	-	-	-	28	25
SURF	-	-	-	-	18	5
TOTAL CLAMS	5,256	2,702	-	-	2,365	2,323

SEE FOOTNOTES AT END OF TABLE.

(CONTINUED ON NEXT PAGE)

Source: National Marine Fisheries Service

TABLE 2 (Continued)

NEW ENGLAND FISHERIES

LANDINGS BY STATES, 1971 - Continued

SPECIES	MAINE		NEW HAMPSHIRE		MASSACHUSETTS	
SHELLFISH ET AL. - CONTINUED	THOUSAND POUNDS	THOUSAND DOLLARS	THOUSAND POUNDS	THOUSAND DOLLARS	THOUSAND POUNDS	THOUSAND DOLLARS
CONCHS	10	1	-	-	47	11
MUSSELS, SEA	150	35	-	-	209	50
OYSTERS, MARKET:						
PUBLIC:						
SPRING	-	-	-	-	3	8
FALL	-	-	-	-	3	6
PRIVATE:						
SPRING	-	-	-	-	22	64
FALL	-	-	-	-	26	72
TOTAL OYSTERS	-	-	-	-	54	152
PERIWINKLES AND COCKLES	29	15	-	-	-	-
SCALLOPS:						
BAY	-	-	-	-	2,050	3,507
SEA	397	564	-	-	3,949	5,840
TOTAL SCALLOPS	387	564	-	-	5,999	9,347
SQUID	(1)	(1)	-	-	979	76
SEA URCHINS	52	4	-	-	-	-
IRISH MOSS	470	14	-	-	1,600	48
BLOODWORMS	608	1,382	-	-	1	2
SANDWORMS	753	674	17	18	112	138
TOTAL SHELLFISH ET AL.	44,682	26,595	849	783	23,599	20,012
GRAND TOTAL	142,684	31,129	1,337	864	276,626	48,348

TABLE 3

VALUE OF CATCH - NEW HAMPSHIRE OFFSHORE AREA

(Gloucester and Portland Landings)

AREA	1971	1972	1973	TOTAL
1	$18,200	$0	$54,600	$72,800
2	28,000	34,200	30,200	92,400
3	23,600	97,200	201,000	321,800
4	33,800	98,800	224,400	357,000
5	38,800	1,200	800	40,800
6	32,800	100,000	147,400	280,200
7	33,800	98,200	192,600	324,600
8	49,000	140,600	192,000	381,600
9	109,200	68,000	105,200	277,400
10	21,000	6,600	30,800	58,400
11	53,400	45,600	58,000	157,000
12	56,400	151,000	104,600	312,000
13	24,000	120,000	22,200	166,200
14	19,000	17,400	20,800	57,200
	$536,000	$978,800	$1,384,600	$2,899,400 (1967 Dollar

NOTE: Figures doubled to account for sampling error. (See text for explanation.)

SOURCE: Southeastern New Hampshire Regional Planning Commission (See text).

TABLE 4

VALUE OF COMMERCIAL CATCH

TEN MILE BAND OFF NEW HAMPSHIRE COAST

AREA	1971	1972	1973	TOTAL
1	$18,200	$ 0	$54,600	$72,800
2	28,000	34,200	30,200	92,400
5	38,800	1,200	800	40,800
6	32,800	100,000	147,400	280,200
7	33,800	98,200	192,600	324,600
TOTALS	$151,600	$233,600	$425,600	$810,800

(1967 Dollars)

NOTE: Portland and Gloucester landings only. Figures doubled over those reported. (See text for explanation.)

SOURCE: Southeastern New Hampshire Regional Planning Commission (See text).

The value of shellfish (primarily lobster) must be added to these figures, in addition to finfish caught commerciallyin the area and landed in New Hampshire. The NMFS estimates (Table 2) that New Hampshire finfish landings (mostly cod, flounder, and shrimp) were valued at $81,000 in 1971 or about $67,000 using 1967 dollar values.

Lobsters landed in New Hampshire in 1971 totalled 667,000 pounds and were valued at $741,000 ($610,600 in 1967 dollars). Assuming that 90% of those landings are caught in the ten mile band, the 1971 catch there would be valued at $666,900 (in 1967 dollars, $549,500).

An approximation to the total catch within approximately 10 miles of the New Hampshire c oast is summarized in Table 5. It is the sum of the estimated catch landed at Gloucester and Portland from grid areas 1, 2, 5, 6, and 7, plus 90 per cent of the New Hampshire lobster landings; plus an arbitrary 50% of New Hampshire finfish landings assumed to have been caught in the area.

TABLE 5

TOTAL VALUE OF CATCH - 1971

APPROXIMATE 10 MILE BAND OFF N.H. COAST

(All figures in 1967 dollars)

Finfish - New Hampshire Landings	$33,500
Finfish - Gloucester and Portland Landings	125,000
Lobsters - New Hampshire Landings	549,800
	$708,300 (1967 Dollars)
	or 1,123,400 (1975 Dollars)

Source: Southeastern New Hampshire Regional Planning Commission (See text).

In absolute dollars, these numbers appear to be substantial. They need to be put into regional perspective, however, particularly as to the amount of catch reported from other known fishing areas. The highly productive Georges Bank area was chosen for comparison purposes. Two year catch data (1969-1970) is readily available from an MIT research effort, The Georges Bank Petroleum Study. Figure 1 indicates the location of the various areas for which data is available, while Figure 2 gives an indication of the two year value of catch. The data indicates that, as far as New England fishing is concerned, the effort and yield on Georges Bank per 100 square mile grid is approximately four times greater on an annual basis than those areas off New Hampshire, such as Jeffrey's Ledge. A review of foreign effort shows a similar trend (see section on foreign fishing).

Comparison of lobster catch data with Maine and Massachusetts, reveals that New Hampshire landings, on a pounds per-mile-of-coast basis, is comparable. This is to be expected as virtually all of New Hampshire's limited territorial waters and occasional areas further offshore, harbor exploitable lobster concentrations.

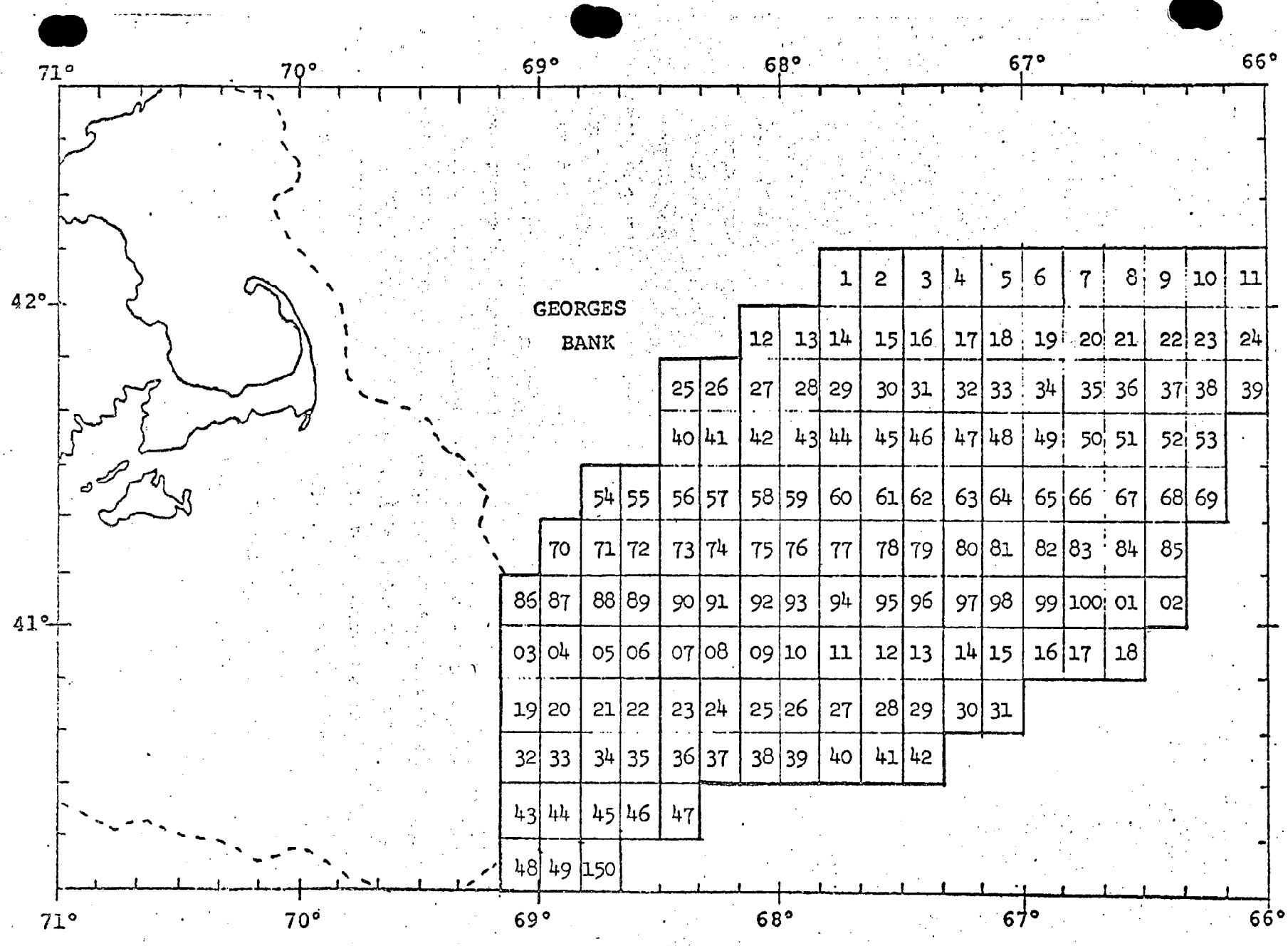

Figure 1. Area covered by NMFS Catch Data and Coding of Grid Squares
Source: Georges Bank Petroleum Study

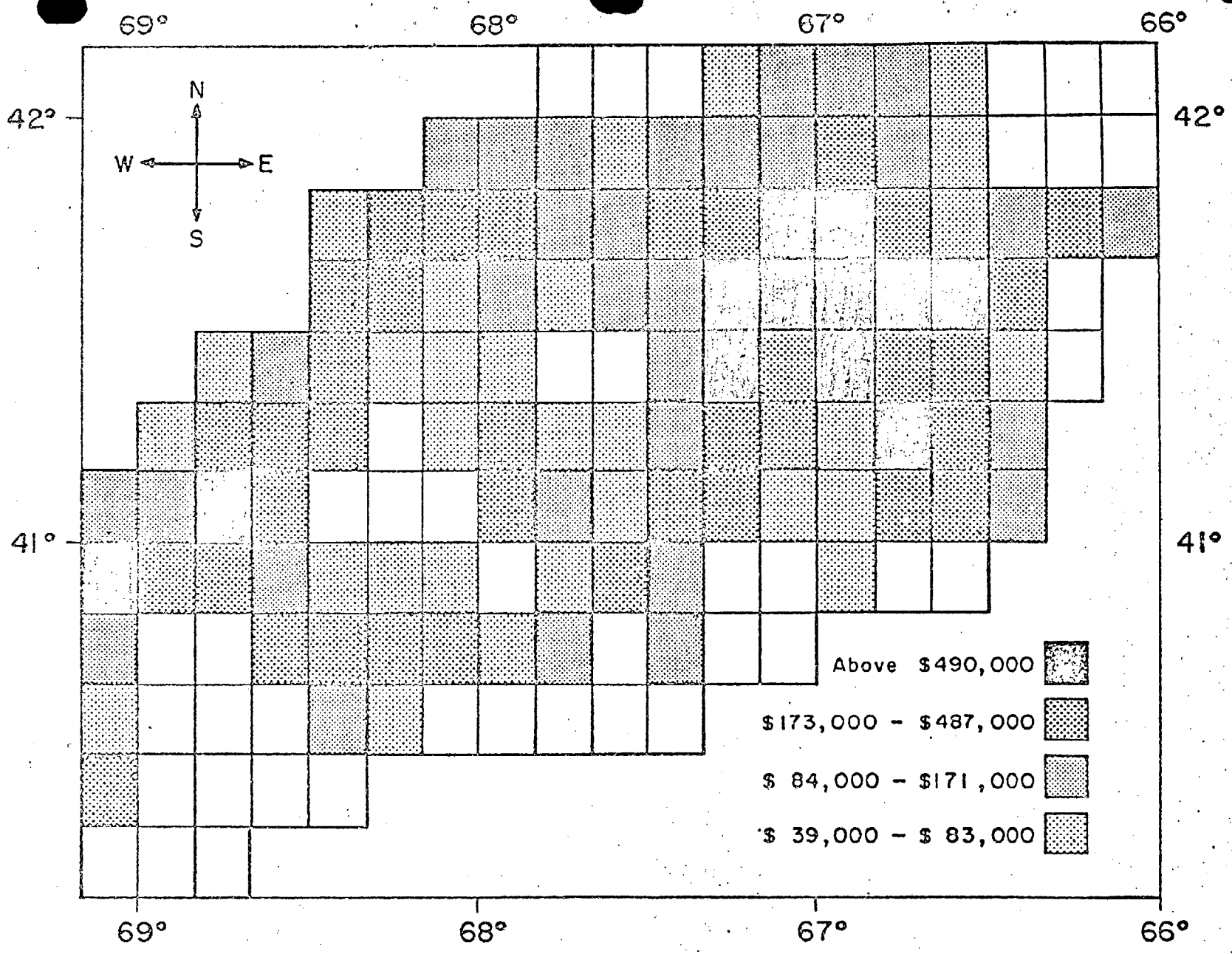

Figure 2. Distribution of 1969-1970 U.S.A. Yield Across Bank.

Source: Georges Bank Petroleum Study

FOREIGN COMMERCIAL FISHING

There has been considerable discussion throughout coastal New England about the effects of foreign fishing activity on United States fishing fleets, especially the decreased catch by U.S. boats. Large numbers of vessels from the Soviet Union and other countries fish throughout the region, particularly on the Georges Bank. Closer to New Hampshire a number of foreign vessels (primarily Eastern European) fish Jeffrey's Ledge each summer - principally for herring.

According to vessel sighting reports furnished by the National Marine Fisheries Service, individual foreign fishing and support vessels located off the entire New England and Middle Atlantic coasts in 1972 generally numbered more than two hundred. Exceptions to this were during July, November, and December of 1972 when the number dropped slightly below this level. Of these, about half were from the Soviet Union. (See Table 6). The Soviet vessels were comprised largely of freezer and factory stern trawlers and medium size trawlers, but support vessels, such as factory base ships, refrigerated fish carriers, and tankers were also counted in the totals. The Soviet effort was largely concentrated in the Georges Bank area and off southern New England. Other countries with major fishing fleets off the New England and Middle Atlantic states were Poland and East Germany, but their representation was far less significant than that of the Soviets.

The general pattern of Soviet dominance does not hold for the Jeffrey's Ledge fishing area. According to 1972 sighting reports, the area is generally fished for herring by vessels from countries such as Bulgaria, East Germany, and Poland. Fishing activity in this region is primarily accomplished in the summer and early fall. (See Table 7.) These vessels were largely stern trawlers with some side trawlers also working in the area.

TABLE 6

1972 FOREIGN FISHING [redacted]VITY BY MONTH

NEW ENGLAND AND MIDDLE ATLANTIC COASTS

INDIVIDUAL VESSEL SIGHTINGS

COUNTRY	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
BULGARIA	9	8	8	7	7	6	5	5	5	3	3	5
CUBA						1		1	1			
EAST GERMANY	21	18	27	27	11	22	16	30	49	50	10	18
FAEROES ISLANDS				1	3							
FRANCE									1	2		
GREECE				2	1							
ITALY	1	1										5
JAPAN	5	10	7	6	-	6	7	10	15	12	-	17
NORWAY			2									
POLAND	43	49	63	65	38	33	11	26	55	52	30	31
ROMANIA			1	3	3			2	4	5		
SOVIET UNION	167	188	190	213	201	166	143	135	141	133	101	87
SPAIN	12	17	8	5	3	2	2	18	8	1	-	8
WEST GERMANY							3	14	15	14	3	2
TOTAL	258	291	306	329	267	236	187	241	294	272	147	173
% CHANGE FROM 1971	(+50%)	(+11%)	(+16%)	(+12%)	(-14%)	(+38%)	(+33%)	(0)	(+6%)	(0)	(-33%)	(-30%)

NOTE: Results of visual sightings from aircraft - may be in error

Does not include Canadian vessels

Stern trawlers are the most visually evident vessels on Jeffrey's Ledge. Although exact size relationships are difficult to establish, the National Marine Fisheries Service indicates that these stern trawlers run up to ten times the size of smaller United States draggers and present an "awesome" sight to crewmen on these smaller boats. National Marine Fisheries Service representatives indicate that the side trawlers, while less imposing than the stern trawlers (one and one half to two times the size of a "typical" United States vessel of some 80 feet) may, curiously enough, pose a greater threat to United States fisheries due to the less sophisticated fish locating gear which they carry despite their obviously smaller capacity. The reasoning behind this statement is that the larger stern trawlers are more efficient with their better fish locating equipment, enabling them to concentrate on the species of primary interest to them. The smaller vessels have less control over their activities, and may account for substantial "by-catch" of species other than their primary quarry.

Foreign catch data for the Jeffrey's Ledge area similar to that obtained for U.S. fleets is not available. The most detailed data available from the International Commission for the Northwest Atlantic Fisheries (ICNAF), which maintains international catch records in the region, covers a much wider geographical (ICNAF Subarea 5Y shown on Figure 3) than the study area. The data does serve, however, as an indicator by species, of broad foreign effort. Interpretation as to the size of the Jeffrey's Ledge catch can not be made from this data.

Tables 8 and 9 give information pertaining to comparative levels of U.S. and foreign effort in the ICNAF subarea 5Y, both by general type of species (groundfish, pelagic, etc.) and by detailed listing of species. What the data indicates is that the United States catch in Subarea 5Y is considerably greater than the combined reported foreign effort in the area. (This is a reflection of an international quota system set up by ICNAF which depends on voluntary adherence by member countries.

TABLE 7

1972 FOREIGN VESSEL ACTIVITY BY MONTH

JEFFREY'S LEDGE FISHING AREA (VICINITY C&GS CHART 1206)

INDIVIDUAL VESSEL SIGHTINGS

COUNTRY	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
BULGARIA	4 (Stern)					
EAST GERMANY	4 (Stern) 2 (Side)	4 (Stern) 1 (Side)				1 (Stern)
POLAND	3 (Stern)					

NOTE: Results of visual sightings from aircraft - may be in error
Does not include Canadian vessels

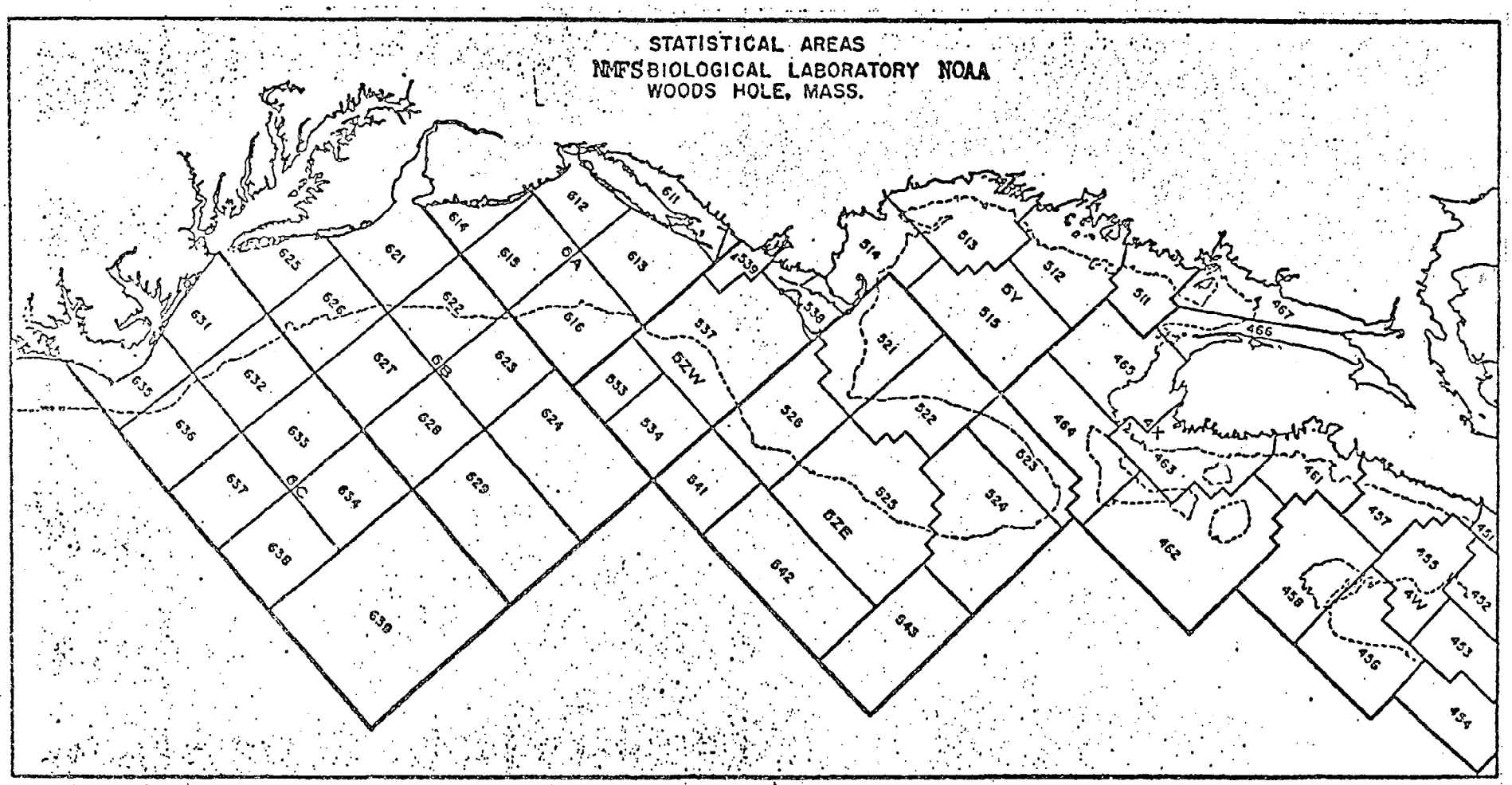

FIGURE 3: Location of ICNAF and NMFS statistical areas.

TABLE 8

1972 Reported ICNAF Landings by Species Group by Nation for Subarea 5Y in Metric Tons (round fresh)

	Finfish	Groundfish	Pelagic	Shellfish	Other	All
Canada	11887	249	11638	-	-	11887
West Germany	3666	538	3097	-	31	3666
Poland	239	-	238	-	1	239
USSR	5748	1122	2273	100	2253	5748
USA	78686	32826	44678	38507	1182	117193
East Germany	12987	2852	10078	-	57	12987
Total	113113	37587	72002	38607	3624	151720

NOTE: Figures do not add horizontally because there is an overlap of finfish with groundfish and pelagic. ALL refers to species totals.

SOURCE: International Commission for the Northwest Atlantic Fisheries

TABLE 9

1972 Reported Landings by Species by Nation for Subarea 5Y in Metric Tons (round fresh)

	Canada	West Germany	Poland	USSR	USA	East Germany	Total
Cod	53	13	-	11	6776	64	6917
Haddock	23	-	-	4	909	-	936
Silver Hake	-	131	-	857	5570	93	6651
Red Hake	-	-	-	5	367	-	372
Redfish	14	-	-	60	7150	20	7244
Pollock	147	394	-	32	3171	2675	6419
Witch	1	-	-	3	1121	-	1125
Yellowtail	1	-	-	-	1005	-	1006
Sculpins	-	-	-	60	-	-	60
Sea Robins	-	-	-	90	-	-	90
White Hake	8	-	-	-	2119	-	2127
Wolfishes	2	-	-	-	98	-	100
Herring	11638	2930	100	256	38196	9296	62416
Mackerel	-	166	138	1934	937	782	3957
Butterfish	-	-	-	83	24	-	107
Pelagic (NS)	-	1	-	-	-	-	1
Alewife	-	-	1	42	1006	33	1082
Dogfish	-	-	-	-	-	17	17
Shad	-	30	-	-	-	-	30
Sharks	-	-	-	183	-	-	183
Skates	-	-	-	200	64	-	264
Other (NS)	-	1	-	160	-	7	168
Shellfish	-	-	-	20	-	-	20
Squids	-	-	-	80	45	-	125
TOTAL	11887	3666	239	4080	68558	12987	101417
Also: Argentine	-	-	-	1668	-	-	1668
Total				5748			103085

Source: International Commission for the Northwest Atlantic Fisheries.

Quotas, and therefore fishing effort may change from year to year). Foreign effort in the region appears to be almost totally concentrated on herring, while United States fishermen concentrate heavily on ground fish such as cod, silver hake and pollock, as well as the lower-valued herring. Discussion with National Marine Fisheries Service representatives reveals that this pattern does persist in the immediate study area.

Caution must be used when attempting to draw any conclusions from available data regarding the foreign fishing effort in the Jeffrey's Ledge region and its effect on New Hampshire fishermen. In addition to the difficulty in obtaining an accurate indication of catch on the ledge, the nature of the foreign fishing effort itself results in the loss of data of interest to United States coastal fishermen. Although the foreign effort is generally species specific, smaller quantities of other species caught in the process, such as cod, which may be significant to United States fishermen, go entirely unreported by foreigners. Thus, in addition to the lack of data specifically applicable to the area of concern, we are also subject to a lack of resolution of the data with respect to species of concern to New Hampshire and other coastal United States fishermen. In this respect, foreign reported landings will be misleading with respect to ground fish.

New Hampshire fishermen do not appear to be overly concerned about direct interference from foreign vessels, though they feel that they can be affected indirectly in a number of ways. Direct effects of foreign fishing on New Hampshire fishermen are largely confined to occasional run-ins between foreign mid-water trawls and the gill nets of local fishermen. These run-ins are infrequent, due to the fact that most New Hampshire vessels stay closer to shore and fish for lobsters during most of the year, seeking other species only in the less productive (for lobsters) winter months. It should also be noted that encroachment of foreign vessels into the U.S. fisheries zone (twelve-mile limit) is not deemed a major problem by the New Hampshire fishermen.

Indirect, or secondary, effects may be more severe than the immediate concerns mentioned above. New Hampshire fishermen have indicated that over-fishing for herring (by U.S. and Canadian boats as well as Eastern European) is becoming a problem as stocks are being depleted and herring catch has fallen. National Marine Fisheries Service data indicates that between 1971 and 1973 the foreign herring catch in the general area of Jeffrey's Ledge has decreased by a factor of more than two. In addition, stocks of juvenile herring along the Maine coast have shown a noticeable decline. The effect on herring fishermen is direct and obvious -- less fish. Indirectly, decreases in the stocks of such fish as cod, pollock, haddock, silver hake and others which feed upon herring can be expected. Significant catches of these fish are made in the Gulf of Maine by vessels from New Hampshire, Maine and Massachusetts, as indicated in the earlier section on domestic fisheries.

ADDENDUM 1

METHODOLOGY - CALUCULATION OF LANDED VALUE

100 SQUARE MILE GRIDS OFF OF NEW HAMPSHIRE COAST

Landed values presented in Table 3 in the body of this appendix represent 1967 dollar values for Portland and Gloucester finfish landings in 1971, 1972 and 1973.

Portland and Gloucester reports on fish landings in pounds are summarized for 100 square mile grids on the map entitled Offshore Fisheries. This information was obtained from the National Marine Fisheries Service at Woods Hole, Massachusetts. Massachusetts average prices for each species were also obtained from NMFS data. These were reduced back to the 1967 dollar value base and used to calculate aggregate value of catch. The reported value of catch was rounded and then doubled to account for reporting error. Values were then totalled by area and year, and are presented in the body of this appendix as Table 3, "Value of Catch - New Hampshire Offshore Area."

A sample calculation follows. (Complete calculations are available from the Southeastern New Hampshire Regional Planning Commission.)

PRICES BY SPECIES

	1971	
Cod	.1230	(.1014)
Fluke	.4055	(.3342)
Haddock	.2616	(.2156)
Herring	.0167	(.0137)
Miscellaneous (Food)	.1141	(.0943)

NOTE: ( ) indicates 1967 dollar value of landed price.
Consumer price index, 1971 = 1.213 (1967 = 1.00)
1971 price for cod = .1230
1967 equivalent = .1230 ÷ 1.213 = .1014

LANDED VALUE

Area 1

1971	No. Pounds	Value Per Pound	Landed Value
Cod	2000	(.1014)	$202.80
Fluke	1000	(.3342)	334.20
Haddock	500	(.2156)	107.80
Herring	600,000	(.0137)	8,220.00
Misc. (Food)	2400	(.0943)	226.32
		Total	9,091.12
		Rounded	9,100.00
		Doubled	18,200.00

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COASTAL ZONE LAND USE CAPABILITY ANALYSIS

COASTAL ZONE LAND USE CAPABILITY ANALYSIS

I. INTRODUCTION

- A. Terminology
- B. Methodology

II. INVENTORY, ANALYSIS, AND EVALUATION

- A. Topography
- B. Earth Materials
  - 1. Surficial Geology
  - 2. Soils
- C. Slope
- D. Groundwater
- E. Surface Water
- F. Land Use and Vegetative Cover
- G. Water and Sewer

III. CLASSIFICATION

INTRODUCTION

The following section deals with the land-related resources for the coastal zone of New Hampshire. It fulfills in part the relevant sections, Paragraph B of the FY '75 CZM Contract, and (CZM PAR 923, 12 (a)).

TERMINOLOGY

Before a discussion of land use capability begins, it will be helpful to clarify some of the terminology employed. The CZM Act uses the terms "capability" and "suitability". The semantic arguments over the differences between these two terms is enough to make Joyce's Ulysses read like a fairy tale. In that the Act clearly represents an application of the environmental planning method, the term "suitability" is probably most appropriate. The word has become "such a part of the jargon of environmental planning that suggesting an alternative seems counterproductive". (Brandes, 1973). Because of the confusion raised by the Act and the concern of OCP over the use of these terms, a definition of each, as used in the subsequent discussions, follows:

Capability - the ability of a given natural resource or set of resources on a given geographic site to sustain urban development.

Suitability - the ability of a specific geographic site to sustain urban development based on site "capability" as well as such factors as water/sewer, highway access, and socio-economic demand.

The term development and urban development are used interchangeably to apply to those uses requiring significant physical alterations to coastal lands. These uses might include, but not

be limited to: residential, commercial, industrial, and commercial-recreational construction.

The term "natural factor" will refer to a feature such as slope, soil conditions, or groundwater. The term natural factor "category" or "characteristic" will be used interchangeably to refer to a particular type of natural factor such as "0-8% slope" or "sand and gravel" soils. The term natural "resource" is synonymous with both natural factor (eg., "groundwater") and natural characteristic (eg., "aquifer/aquifer recharge area"). It was used where it was deemed appropriate to the discussion, but not intended to confuse the reader.

METHODOLOGY

As part of the procedure for "defining permissable land and water uses within the coastal zone which have a direct and significant impact upon the coastal waters" (CZM PAR 923 (a)) both an "inventory" and "analysis" of the various land-related "natural and man-made coastal resources" was undertaken (CZM PAR 923, 12 (a) (2)). The aim of this effort was to determine the "capability and suitability for each type of resource and application to all existing, projected or potential uses." (CZM PAR 923, 12 (a) (3)).

Although the "state of the art" in land use planning can employ rather sophisticated models and methods for determining land use capability, such methods require large inputs of time, money, and relevant data. Since such luxuries were not available to OCP or the Strafford-Rockingham Regional Council, a more simplistic, though nonetheless valid approach to land use capa-

bility was utilized. This approach or model (as well as most other capability models) employs the proposition that the natural environment should significantly determine future land use. By analyzing and understanding coastal natural resources one can determine not only the best places to develop, but also the best places not to develop.

The land use capability model can conceptually be broken down into four parts: (1) Inventory, (2) Analysis, (3) Evaluation, and (4) Classification. However, for the purposes of this discussion, the first three steps will be included subsequently within each section of the relevant natural factors considered in the capability analysis. These four steps are briefly discussed below.

INVENTORY

In this step all relevant natural factor data and man-made features are collected and mapped. Each factor was broken down into appropriate map categories. For example, the slope map contained the following categories: (1) 0-8%, (2) 15%, (3) 15-25% and (4)> 25%. Most of the information for the inventory is derived from published sources. For some of the data, however, field investigation were necessary to supplement existing information. The detailed inventory for land-based natural factors was conducted only in the primary and secondary coastal communities (as defined per section 2A of the FY '75 Contract). The data were mapped at a scale of one inch equals 2000 feet using all or parts of the appropriate coastal zone 7½-minute U.S.G.S. quadrangle maps as base maps. The following chart shows the natural factor maps that were completed for each quadrangle. For mapping purposes the relevant portions of the Newburyport East, Mass. Quadrangle was

combined with the Hampton, New Hampshire Quadrangle; and the Kittery and Isles of Shoals, New Hampshire Quadrangles were combined.

Paper print maps were used for the Newmarket and Hampton Quadrangles. All other maps were on mylar overlays, except the "Areas of Particular Concern Maps". These were also put on paper prints, because it was much less confusing than using mylars.

Natural Factor \ U.S.G.S. Quad.	DOVER	NEWMARKET	EXETER	DOVER W	PORTSMOUTH	KITTERY - ISLES OF SHOALS	HAMPTON - NEWBURYPORT EAST, MASS.
- Surficial Materials	●	●	●	●	●	●	●
- Soil Conditions	●	●	●	●	●	●	●
- Slope	●	●	●	●	●	●	●
- Surface Drainage	●	●	●	●	●	●	●
- Groundwater Potential	●	●	●	●	●	●	●
- Land Use and Vegetative Cover	●	●	●	●	●	●	●
- Water	●	●	●	●	●	●	●
- Sewer	●	●	●	●	●	●	●
- Areas of Particular Concern	●	●	●	●	●	●	●
- Land Use Capability	●	●	●	●	●	●	●

ANALYSIS

Once the data was gathered and mapped, it was then analyzed to gain a full understanding of the various coastal resources. For instance, wetland soils were discovered to be poorly drained and to act as natural sponges during periods of high runoff, thereby preventing excessive flooding. These facts by themselves had important implications for land use capability.

However, it was soon discovered that consideration of individual natural factors and natural factor categories in isolation was not wholly appropriate. It was not good enough to know just that a particular soil was poorly drained or well drained. Although such characteristics have implications for development by themselves, they become more significant when considered with factors like slope, vegetation, and nearness to water bodies. When these factors are considered together, a better understanding of coastal ecosystems and natural processes can be achieved. This approach also has value because it leads to appropriate land use capability classifications and definition of "permissible land uses".

The Coastal Zone Management Act requires a definition of permissible land uses based upon their impact on coastal waters. In order to assess such impacts a more holistic natural resource analysis was decided upon. If marine estuarine organisms depend on the natural cycle of nutrient flow from upstream waters and land areas, any significant alteration of these areas will have a decided impact on the nutrient flow and thus, the marine habitat. It was crucial then to understand the coastal area as a set of resources interacting over time and space.

EVALUATION

Once the natural factors were fully analyzed, they were evaluated

individually for their ability to support general urban development. The "values" attached to the various categories or characteristics of each natural factor were subjective in nature based upon: (1) adopted plans and policies of the coastal zone communities as well as the adopted Preliminary Comprehensive Land Use Plan for Substate District # 6, (2) state land use policies as expressed in the statutes, such as the Dredge and Fill Act, RSA 483-A, and (3) the best reasoned judgement of the planners at the Strafford-Rockingham Regional Council. These judgements were based upon the following criteria with assistance from expert natural scientists including hydrologists, geologists, and soil scientists:

(1) Potential "cost savings" if area were developed

(2) Presence or absence of physical limitations to development

(3) Whether the resource was a potential "area of particular concern" (See discussion on areas of particular concern)

(4) Potential unreasonable environmental impact if resources were developed.

The initial evaluation sorted out various natural features into general capability groupings based on their ability to sustain urban development. For instance, 0-8% slopes are more capable of sustaining development than 15-25% slopes. The subsequent discussions for each natural factor makes the specific evaluations clearer. This evaluation represents the initial step in determining geographic "areas of particular concern", permissible uses and determination of priority of uses in the coastal zone. For instance, such areas as lakes, coastal wetlands, and aquifer/aquifer recharge because of thier inherent vulnerability to man's intrusions become potential "areas of particular concern". On the other hand better drained, more gentle sites are more appropriate for residential, commercial or industrial uses.

CLASSIFICATION

The formulation of land use capability classes - which translate to more specific areas on the base maps - is based upon the specific values derived from the above procedure. Natural resources that have value for man when left undeveloped (wetlands, etc.) become areas of resource protection, generally analogous to areas of particular concern. (The latter includes areas other than just valuable natural resources. Areas that represent unusual economic opportunity may also be considered.) Areas that are more capable of development, are ranked according to their ability to sustain development.

The subsequent section will discuss the inventory, analysis, and evaluation of each of the relevant natural factors in more detail. This will be followed by a discussion of the capability classification system and how the various classes or areas can be related to appropriate coastal zone land uses. (See discussion of Permissible Land Uses).

INVENTORY, ANALYSIS AND EVALUATION

TOPOGRAPHY

The coastal zone lies geographically in what has been called the Seaboard Lowland section of the New England Physiographic province (Fenneman, 1938). Elevations range from sea level to about 200 feet for most of the area. The highest point in the region is Hicks Hill in Madbury -- 320 feet.

The undulating topography of the coastal region generally conforms to the underlying ledge or bedrock, although a number of the hills are composed of glacial deposits. The features of greatest relief are generally the rock-cored hills, such as Great Hill in Newmarket. The other hills are of glacial origin such as

Garrison Hill in Dover which is geologically known as a drumlin (a massive deposit of glacial till). Many of the flat sites and river valleys contain swamps and wetland areas. Much of Rye and Durham Point are covered by these wet areas. The wetlands are often flanked by glacial terraces or outwash plains that tend to be very sandy and flat, and are anywhere from 30 to 80 feet higher than the low areas.

It is important to evaluate the topography of the coastal zone, because it provides much of aesthetic quality that makes the area so unique. Since there are so few areas of relatively high relief, these become a visual asset. In addition to being the most visible elements in the landscape, these prominences provide long views. The scenic and recreational value is of both local and regional significance.

A number of hills were considered as areas of resource protection (see Classification discussion following) and as potential "areas of particular concern". These hills were chosen on the basis of their relative relief. They had to provide unobstructed views of their surroundings and/or be features which provided prominent observable relief from their surroundings. Specific decisions were based on contour map investigation and field observation using these criteria.

EARTH MATERIALS

An investigation of earth materials is important for understanding and evaluating their potential for numerous uses such as water supply, agriculture, residential development, and mineral excavation. For purposes of the Coastal Zone resource inventory only surficial deposits -- those unconsolidated material overlying

the ledge or bedrock -- and soils -- the layer of material that extends from the earth's surface to 3-4 feet -- are being considered. Although the ledge or bedrock is an important element of earth materials, it is not of major value in coastal zone planning and will be treated only when it becomes significant to other natural factors, ie., soils.

Surficial Geology

The surficial geology investigation relied heavily on the work of Edward Bradley (1964). Although his studies were somewhat limited, they are the most definitive geologic work done in coastal New Hampshire.

The surficial materials which contribute much to the present day landscape of New Hampshire's coastal area are primarily the result of the last of four continental glaciers, that occurred more than 10,000 years ago. This glacier was a mass of ice about one mile thick which advanced across New Hampshire from the northwest, then melted and retreated. As it moved across the earth's surface, it deposited a layer of poorly-sorted debris called till. This material is made up of a mixture of sand, silt, clay, gravel, and boulders and is usually 15 to 40 feet thick.

As the glacier began to melt and retreat, debris from the ice was transported and deposited in a seemingly random fashion. (See the Surficial Geology Maps). The sand and gravel deposits (ice-contact) are among the more common surficial materials which were laid down close to the melting ice. They consist of the stratified sands, gravel, and boulders, and vary in thickness to maximum of 190 feet. Pudding Hill in Madbury serves as an excellent example of such a deposit. These materials are relatively coarse since there was little sorting by the meltwater.

Similar to the coarse sands and gravels, are the outwash sands and fine gravels (outwash). These types of deposits, were better sorted by the meltwater and thus are made up of finer particles than the sands and gravels. Closely associated with the outwash are the sandy shore deposits that formed along shorelines of an ancient sea, which occurred during the latter stages of the glacial period. Both these deposits range in thickness from one to fifty feet and usually occur as broad sand plains as in central Seabrook. These deposits are combined into one category on the Surficial Geology Map -- Outwash and Shore Deposits.

As the ice sheet continued to retreat, the great quantity of meltwater combined with the then ancient sea to create a sea level which extended about fifteen to twenty miles inland from the present sea level. Fine sand, silt, and clay were deposited to a maximum thickness of 75 feet. These marine clays are recognized by their blue-gray color.

Marine clays are generally poorly drained and in many instances highly unstable particularly when wet. And while they may hold a lot of water, they do not easily transmit it (low permeability). Thus, these deposits are generally unsuitable for wells, building sites with septic tanks, and heavy loads.

The surficial deposits have remained much today as they did after the retreat of the glacier and the lowering of the ancient sea to its present level. The only surficial materials that have accumulated recently are the locally poorly drained swamp deposits in low-lying areas and alluvium that has been deposited along streams.

Because of their excellent drainage and high permeability the sand and gravel deposits often provide excellent building sites.

They also have a high bearing capacity and are easily excavated. However, there are competing demands for these resources. Because of drainage and load-bearing characteristics they also make excellent fill for highways, etc. The pressure to excavate these deposits is enormous. In addition, some of these deposits can hold large quantities of water (called aquifers); enough in some instances to provide the source for municipal water supplies, such as Dover. It is quite clear that a rational policy of land use regulation be adopted for the more valuable sands and gravels in order to avoid contamination of groundwater supplies.

In order to satisfy the competing demands for this resource, a multiple-use policy should be adopted. Initially this would include a detailed hydrologic study of the coastal area to determine the best sources of water, including both ground and surface water. Once this has been completed, regulations can be adopted to protect the most valuable aquifers while the other sand and gravel deposits can be used for development and excavation.

The valuable sand and gravel deposits were identified on the Areas of Particular Concern Map. The critical aquifer/aquifer recharge sands and gravels were also identified as areas of particular concern on this map. These areas are further discussed in the groundwater section of the inventory. Where geologic sands and gravels coincide with sand and gravel soils, they become identified as areas more capable of development. These areas are dealt with more specifically in the soils section of the inventory and the land use suitability section of the classification discussion.

Soils

Soils form the upper organic layer of earth materials which

have developed from the interaction of climate, vegetation, slope, and surficial geology. The present characteristics of each soil type are highly dependent on its position in one of the major surficial deposits. For example, the Hinckley and Windsor soils are located in the level portions of sand and gravel deposits. (See Figure 1.)

The soil conditions maps are interpreted from the Strafford and Rockingham County Soil Surveys, since communities from both counties are within the primary and secondary coastal zone. Although all the inventory maps have essentially the same soil categories, the Strafford County section of the region has generally more accurate and reliable information. This is due to the fact that the 1959 Rockingham County Soil Survey was done for agricultural purposes and with less accuracy control. The Strafford County Survey was completed in 1973 and the soils interpretations were done for a variety of uses including suitability for community development, forestry, wildlife, and recreation as well as agriculture. For purposes of the inventory and land capability mapping, the existing soil information was considered to be of equal value. However, it must be emphatically stressed that the soil information and capability analysis is much more accurate and defensible in Strafford County than in Rockingham County. The Soil Conservation Service will legally stand behind the Strafford County Soil Survey, but not the Rockingham Survey.

Soil conditions are a major factor in determining suitable locations for such urban uses as residential development and recreation. Below is a description of each soil condition category with suggested recommendations for potential development. These categories were developed with assistance from the state Soil

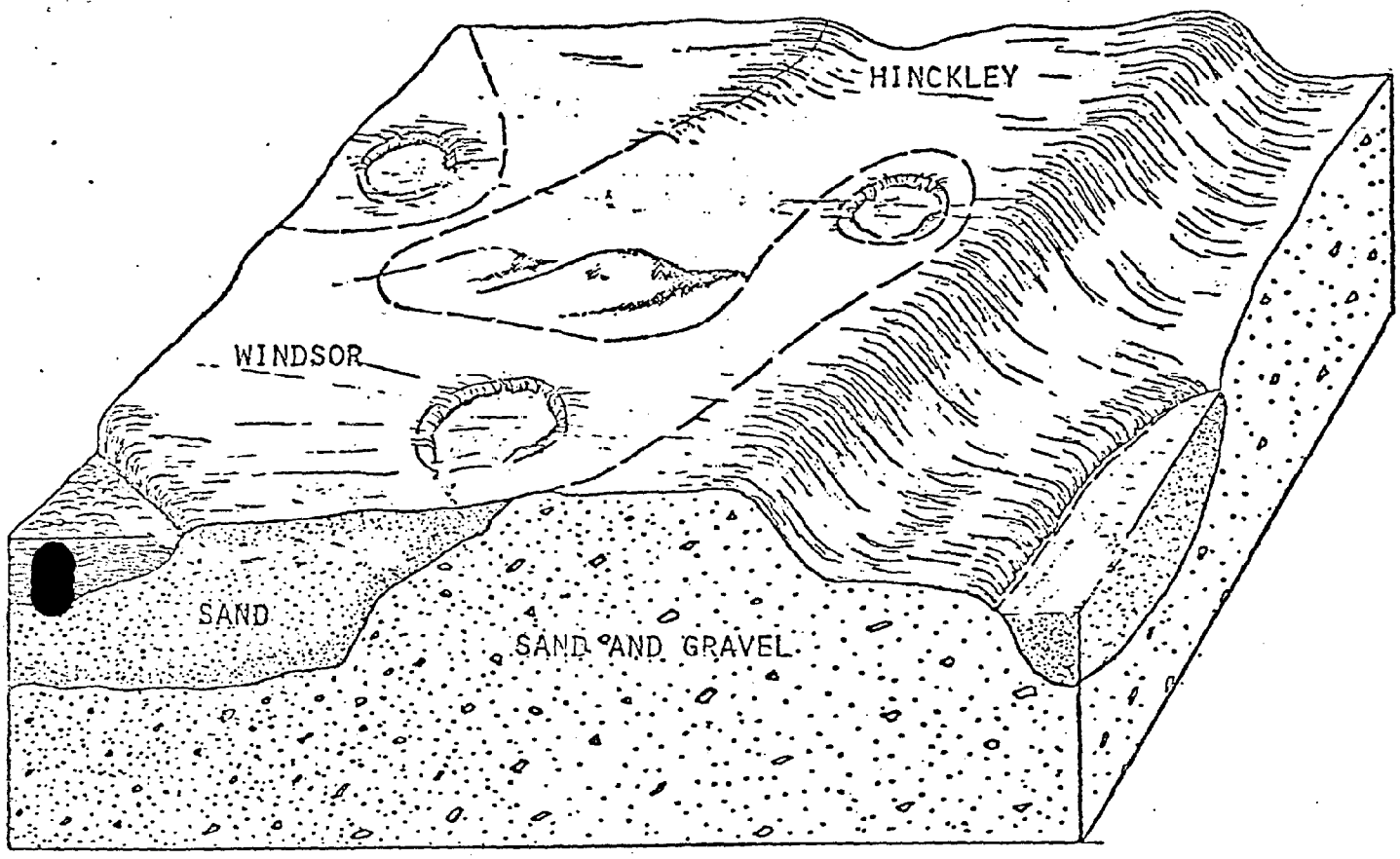

Figure 1. Typical pattern of soils and underlying material in the Hinckley-Windsor-Saugatuck association.

Source: S.C.S., Soil Survey of Strafford County, N.H., 1973

Conservation Service. The soils are listed generally according to their capability for urban development, from least to most capable.

Wetland Soils

These usually formed in association with the marine silts and clays, the sand and gravel deposits, till, and the more recent alluvial sediments deposited by streams and rivers. They include all the poorly and very poorly drained mineral and organic soils, i.e., those having a water table at or near the ground surface for seven or more months of the year (Kelsey, 1973-74).

Wetland soils are best left undeveloped because many occur in natural drainage ways and are valuable when left untouched. Not only do they act as natural sponges to collect excess runoff, thus preventing flooding downstream, but they also serve as a habitat for fish and wildlife. These areas have open space and recreational potential. See areas of particular Concern discussion.

Highly Erodible Soils

The highly erodible soils are located in marine clay deposits, often adjacent to the tidal rivers such as the Cocheco. Development on these soils is generally not recommended, because of the high potential for erosion and stream pollution. They are best left in vegetative cover. Where construction is necessary, proper erosion and sediment controls must be used.

Seasonally Wet Soils

These soils formed in association with parent materials similar to those of the wetland soils, although they are generally better drained. This group includes all moderately well-drained soils or those having a water table within 1½ to 2½ feet of the

ground surface during parts of the year (Kelsey, 1973-74).

Development of seasonally wet soils should be avoided where at all possible. Wet basements and submerged leach fields of septic tanks can be expected, with a distinct possibility of groundwater pollution. Only when waterproof municipal sewer facilities or similar protective measures can be provided should these soils be developed. Waste disposal and fertilizer application should be discouraged.

Shallow to Bedrock Soils

These soils are located on thin deposits of glacial till. Bedrock or ledge in much of the delineated areas is typically 30 inches or less below the ground surface. Shallow to bedrock soils are so thin to bedrock that high density or commercial development is usually unwise because of high costs of constructing foundation and septic tanks or sewer lines. Any kind of development should be of low density on large lots. However, a community may want to overcome the bedrock limitation by constructing water and sewer facilities to serve high density development, which would offset the cost of these services. Newmarket, is a good example of this practice.

Clays and Sands Over Clay Soils

The group consists of all well-drained clays and all well-drained sands over clay soils. Although these soils are generally well-drained, they are somewhat slowly permeable because of the clay layer. As a result a drainage system around the foundation is suggested to carry off water to a settling pond or storm sewer. This system can be quite expensive, but needed in order to avoid any possibility of flooded basements. No on-site septic systems should be allowed because of the potential for groundwater pollution. Only developments that can afford to offset the above limitations should be

considered here.

Deep, Well-Drained, Stony (with hardpan) Soils

These soils occur under the same conditions as the above but typically have a hardpan at about two feet that restricts the downward and lateral movement of water (Kelsey, 1974-75).

While the deep, stony hardpan soils may be well-drained, on-site septic systems should not be used on small lots. The moderately slow permeability and the possibility of a perched water table above the pan are limitations that could lead to groundwater pollution. Development with water and sewer is recommended especially where densities are relatively high.

In Rockingham County the previous two categories are combined into the following one, since there was no distinction in the soil survey between those deep stony soils that had a hardpan and those that did not.

Deep Stony Soils

This group of soils formed in glacial till and comprise all well-drained and small areas of poorly-drained stony soils. These soils may or may not have hardpan layers. These soils have the same limitations as the deep, well-drained stony, hardpan soils of Strafford County.

Deep, Well-Drained, Stony (non-hardpan) Soils

The deep well-drained stony group consists of well-drained loamy soils that are formed in deep, sandy, stony, glacial till.

Although these soils are quite variable in character, most types of development can be considered. The only limitations are stones and clay lenses that might hinder foundation and septic tank construction and drainage.

Sandy and Gravelly Soils

This group includes all well-drained to excessively well-drained soils that have formed in thick sand and gravel deposits.

Sand and gravel soils have the best potential for development since they offer few if any restrictions to construction. However, intensive development with impervious surfaces (roads, parking lots, etc.) can prevent recharge to the groundwater reservoirs in these deposits which may be needed for future water supplies. In addition, if septic tanks are used, they must be carefully constructed and regulated to prevent groundwater contamination from the effluent. High density development must definitely be discouraged in sand and gravel areas where municipal wells are located. The Groundwater section of the inventory covers this more fully.

In conclusion, it must be recognized that neither soil survey is accurate to the site specific level, particularly Rockingham County's. Therefore, rigid land use regulations should not be formulated for specific soil categories or soil types. Where land use ordinances depend on soil criteria, standards and regulations should be flexible enough to allow intelligent planning and management decisions. Such requirements as on-site investigations for certain types or sizes of development is one method for encouraging good planning.

SLOPE

Consideration of slope or steepness of the land in the natural resource inventory is important, because it plays a significant role in the capability of any site for most land uses. For instance, flat sites are suitable for such uses as roads and highways, large commercial and industrial buildings, agriculture, and intensive recreation. As the slopes become steeper many of the uses are not

suitable. In addition, development and service costs increase. Development on such slopes also contributes to the potential for greater erosion and siltation, and pollution of waterways.

Using the U.S.G.S. contour base maps four categories of slope were designated: 0-8%, 8-15%, 15-25%, and 25% and greater. Percent slope is determined by expressing the vertical change as a ratio of the horizontal change. For example, a vertical change of 5 feet with a horizontal change of 20 feet is equivalent to a 25% slope. See Figure 2.

Some suggested land uses for each slope category: 1/

0-3% Flat lands are suitable for most large buildings--industrial and commercial. Roads, highways and active recreation uses such as ball fields are also suitable for these flat areas. Very flat sites may pose such problems as (1) inadequate drainage especially during peak storms; and (2) inadequate gravity flow for sanitary sewers.

3-8% These gently undulating areas are suitable for single family housing on small and medium lots, apartment buildings, secondary roads, as well as most of the activities above, with increasing limitations at the upper extreme of the category.

8-15% Development costs and the potential for runoff and erosion begin to increase. These areas are suitable for single family housing on large lots, townhouses, and garden apartments.

15-25% Townhouses with multi-level entrances, using the cluster technique, can be considered in these areas. The cost of development becomes a major factor. Runoff and

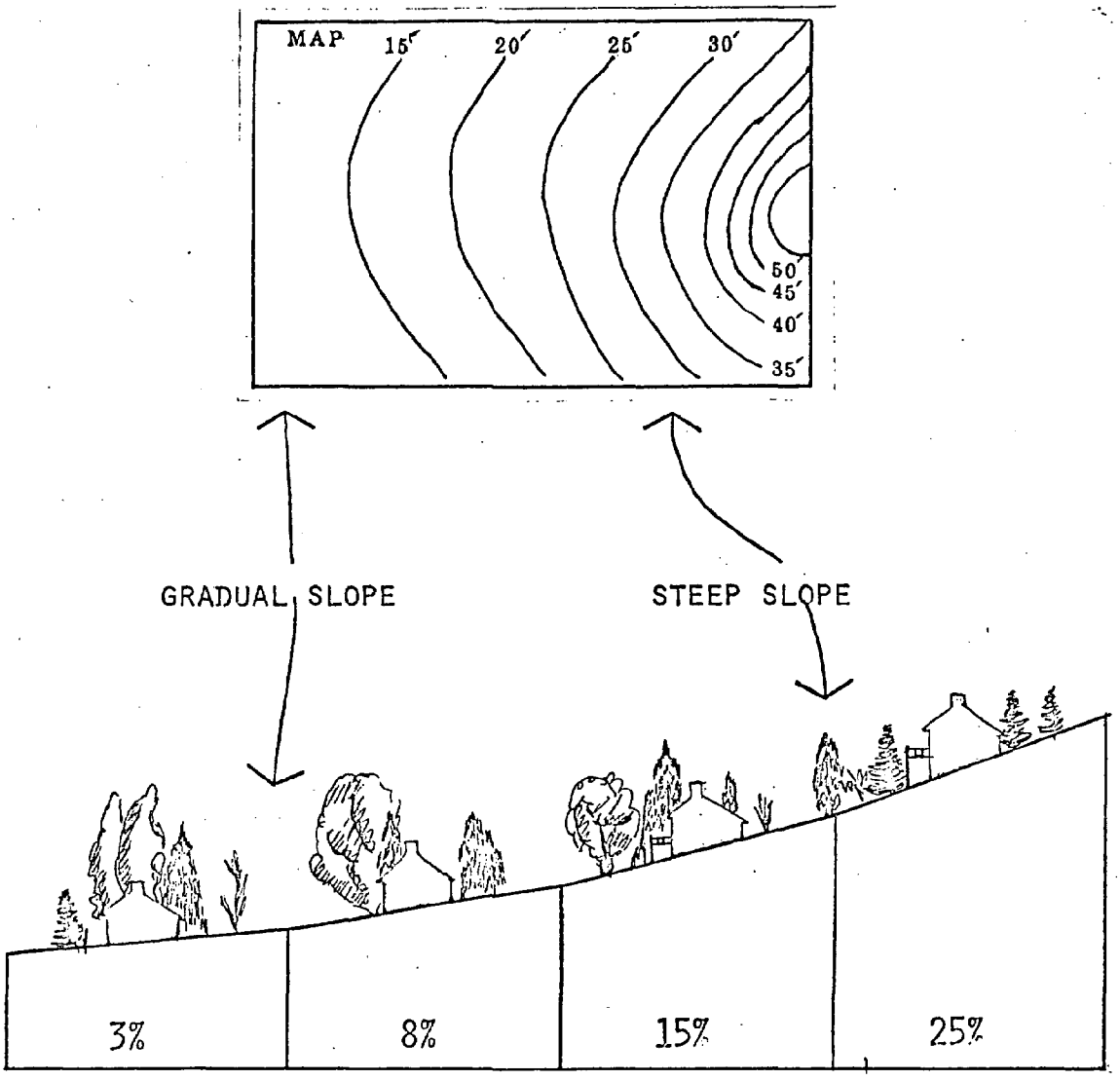

Figure 2. Diagram to illustrate percent slope.

erosion control is essential.

25% and over — Almost all development should be prevented. Development costs and potential environmental impact are high. Such factors as shallow to bedrock, drainage problems, runoff and erosion severely limit construction on these slopes.

GROUNDWATER

Groundwater occurs in openings or pores in the bedrock or surficial materials. The amount of water that these materials can hold depends upon the size and number of the openings and the particle size of the geologic material. If a geologic deposit or unit has numerous openings it is said to be porous. Permeability is the capacity of a given geologic unit to transmit water. In order to have large yields of groundwater, the deposit must have high porosity and permeability. Since sands and gravels have large particles and large pore spaces, they are permeable enough to produce high yields of groundwater. This type of deposit is called an aquifer (a geologic unit that yields significant amounts of water).

The chief source of groundwater is precipitation. Of the precipitation that falls to the earth's surface a small fraction runs directly off the surface, while much of it flows toward streams just below the earth's surface by a means of a process called interflow. Much of the rest returns to the atmosphere through evaporation from surface water or transpiration from vegetation (evapotranspiration). In the coastal area of New Hampshire of the approximately 42 inches of precipitation received annually, half or about 21 inches is lost to evapotranspiration. The remainder infiltrates through the soil to recharge the groundwater. The point at which the geologic unit is completely saturated is known as the water table. See Figure 3 .

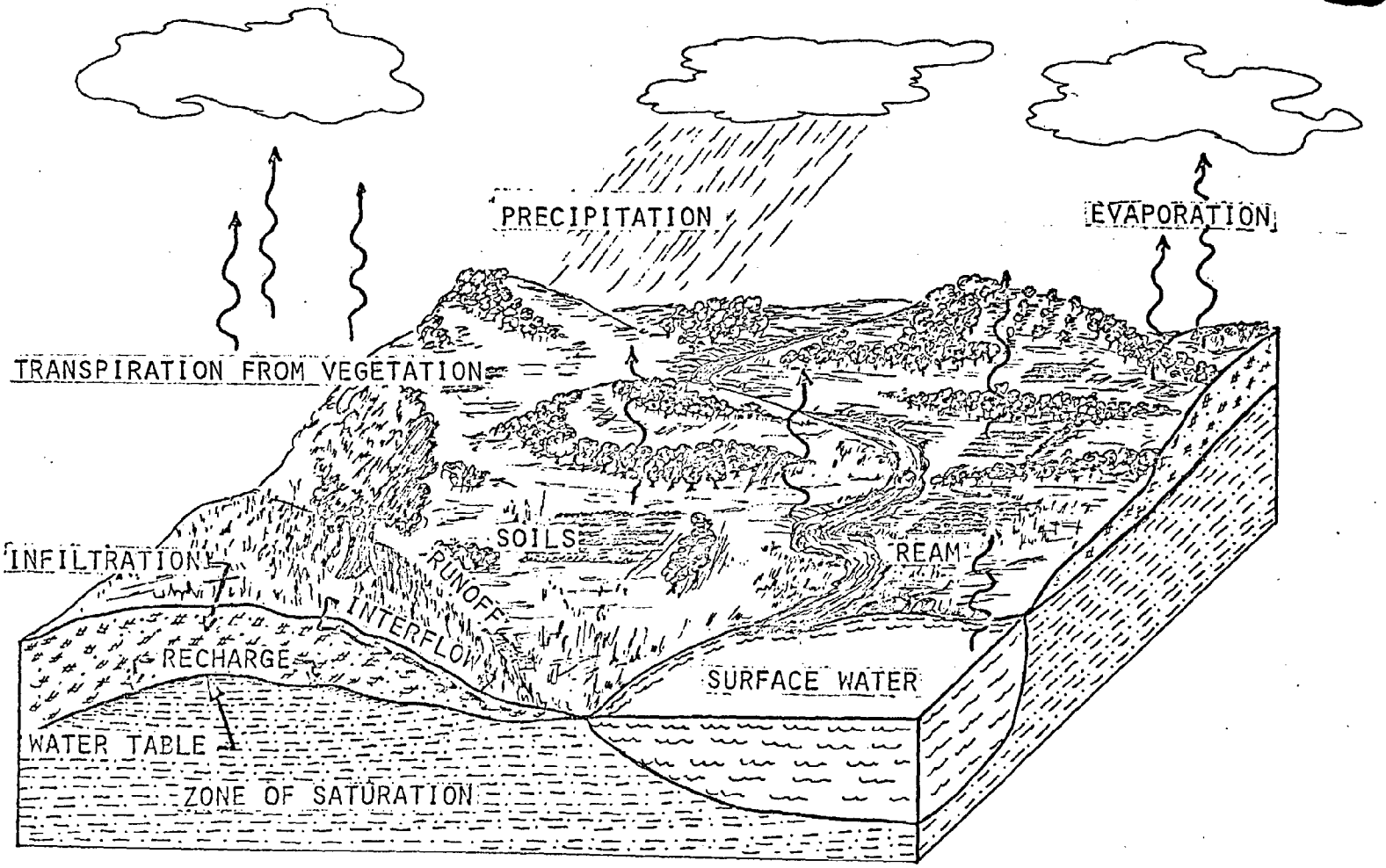

Figure 3 - Relationship of Groundwater to the Hydrologic Cycle

The best potential aquifers in New Hampshire's Coastal Zone are the large sand and gravel deposits. See Groundwater Potential Maps, Good Potential Areas. Because of their excellent permeability yields as high as 700 gallons per minute (gpm) may be obtained (Bradley, 1964). On the groundwater potential maps these areas are either in dark blue or coded as the number 1 (good potential). In some instances these deposits are too thin or too small to provide sizeable reservoirs of water. These are indicated by medium blue color and categorized as moderate potential.

The outwash and shore deposits are moderately permeable and can be expected to yield up to 100 gpm (Bradley, 1964). This kind of yield is suitable for residential, farm, and small industrial supplies. Where well-sorted medium or coarse sands occur in known ancient geologic valleys, the saturated thickness may be quite deep. According to Cotton (1975) these aquifers could yield over a million gallons of water per day. Field work is necessary to make determinations about such deposits and is highly recommended.

Till and marine clay have generally poor potential for anything but domestic water supplies although the groundwater potential maps have distinguished between the two. This was done to indicate a potentially good supply of water under the marine clays. In some instances these clays lie above excellent sand and gravel or outwash deposits, particularly adjacent to rivers. This situation occurs along the Exeter River in Exeter where the town has a municipal well. The small areas of alluvium and swamp deposits were classified as poor potential.

Of all the natural resources, groundwater is probably the single most limiting factor to the amount and type of development in the coastal zone of New Hampshire. Right now groundwater is

the principal source of water in the area. According to Hall (1974) of the 16 million gallons per day water consumption in the seacoast area, 10.5 mgd comes from groundwater. Present population projection indicates that the seacoast area will run out of groundwater supplies by the middle 1980's. This is based on a sustained water yield figure of 25 mgd, which both Hall (1973) and Anderson-Nichols (1969-72) calculate. It is quite clear that the coastal area is facing a potential crisis. In order to meet this need, new sources of water will soon have to be developed either locally or from outside sources. Any such water supply development should be coordinated with growth management policies.

For these reasons it is essential that groundwater resources be protected from contamination in areas that are presently being used as water supplies or that are potential future water supplies. These areas include many sand and gravel deposits as well as some outwash and shore deposits. In some instances medium density development on water and sewer is appropriate in these areas. It is important to prevent incompatible uses, such as oil storage facilities, that might eventurally lead to groundwater contamination. Growth should also be controlled to regulate the amount of impermeable cover, such as roofs and parking lots, in order to maintain adequate recharge of the aquifers. See Mettee, pending for a more detailed discussion of groundwater and its implications for growth in the coastal area of New Hampshire.

For purposes of the inventory mapping the surficial deposits were interpreted for their ability to yield water. The categories for the Groundwater Potential Maps are:

Class	Deposit
1) Good Potential	- Excellent sand and gravel aquifers

2) Moderate Potential - Thin or small sand and gravel deposits
- Outwash and shore deposits

3) Poor Potential - Till, Alluvium, Swamp deposits, Marine clays*

* These were distinguished from the other deposits of poor potential. While they usually are of poor potential, they often overlie extensive sand and gravel aquifers as noted in the discussion. It was decided that this circumstance was worth noting.

SURFACE WATER

The Surface Drainage Maps indicate the relative vulnerability of the various sub-basins in the primary and secondary coastal zone which are part of the Coastal Watershed.

In general, surface water that originates at the headwaters of small watersheds are most vulnerable to development. They have less water volume to assimilate contaminants and dilute solids than do surface waters that have flowed through several stream orders before reaching major rivers. Since ponds and lakes are particularly vulnerable to the impacts of development, they are considered to be in the same class as the headwaters or first order basins. The textured overlay on the maps indicates this.

The coastal zone has many first order basins. Because these basins have little stream flow capacity, they have little assimilative capacity. Therefore, the first order basins are much less desirable to develop than the second, third, and fourth order basins.

Each stream on the surface drainage maps is assigned a stream order designation based upon the tributaries of each stream. For instance, a headwater stream with no tributaries is classified as

a first order stream while a second order stream has at least two first order tributaries, and no tributary larger than a first order. Similarly, a third order stream has at least two second order tributaties, and no tributaries greater than a second order.

WATER AND SEWER

Although these systems are man-made, they were treated here because of the important implications they have for development and defining "permissible land uses" in the coastal zone. The connotation of "suitability" is introduced when these types of factors are considered.

The majority of the towns and cities in the coastal area have municipal water and sewer systems. The Water and Sewer Maps indicate the extent and coverage of each of these systems. These services generally lie within the major population centers of these communities such as urban areas of Dover and Portsmouth. These maps were based on information and maps provided by the appropriate communities.

These facilities provide flexibility to growth patterns because they allow developers the opportunity of overcoming some of the natural limitations to urban growth such as high bedrock or ledge. Where it is appropriate a community can develop at higher densities than with private wells and septic systems. Clustering of development on such facilities encourages a wiser use of land and is generally more economical in the long run. However, provision of water and sewer services does not imply that any kind of development can go anywhere. Critical areas such as wetlands and steep slopes should still be avoided. For environmental and long-term economic reasons these areas should be protected through proper land use regulation.

It is not the purpose of this study to make specific recommendations for future water and sewer systems. However, it is recommended that where possible communities should cooperate in construction of such facilities. This approach would allow greater system flexibility and would result in lower long term costs to the communities involved. It is also recommended that water and sewer planning be done on a watershed basis for ecological and economic reasons.

CLASSIFICATION

Once the various natural factors of the Coastal Zone were evaluated for their ability to support urban development, capability map classes were defined based upon the convergence of given natural factor characteristics. For example, since 0-8% slopes, sand and gravel soils, and fourth order drainage represent the most propitious natural characteristics for development, they were synthesized in Capability Class 1.

At the risk of making a relatively simple process become complex, it was decided that the capability classes should identify the specific natural characteristics that were in convergence. The alternative would have been to aggregate more characteristics into one class, resulting in fewer capability classes. By using the former process loss of valuable data was kept to a minimum in going from the individual factor maps to the land use capability map. Such a system of natural factor synthesis requires numerous capability classes. However, it is infinitely easier for prospective users to determine, when necessary, specific resources from the capability map, rather than continually referring to individual natural factor maps. By definition, Capability Class 1

in the previous example illustrates this point.

At the same time OCP requested that these numerous individual classes be aggregated into four capability classes, which for the sake of simplicity will be referred to as capability "areas" in the discussion. This procedure was followed and the individual map legends reflect both systems of classification. In the aggregated system Capability Class 1 becomes Capability Area 1 or those areas representing "Excellent" capability for development. The capability classes and areas are defined at the end of this section.

More specifically, the process of mapping the various capability classes was achieved through an ordered overlay technique. The first step was to extract from the individual factor maps those areas which by the evaluation process were considered to present particular hazards for development (eg., floodplains) or to represent areas of high social, economic, or environmental cost (eg., coastal wetlands) if improperly developed. These resources fall into what was defined as a resource protection district or the "Poor" development capability area. This area (district) represents a grouping of resources that leads to an initial determination of "areas of particular concern". The term resource protection was employed to identify those areas whose integrity should be protected for the good of the whole coastal zone community. Such a designation does not imply that these areas not be used, but only that uses commensurate with the tolerance of the resource be allowed. Special regulations for these areas may be needed.

Each resource has been numbered and colored where appropriate and identified in the map legend. These resources are listed below, generally in decreasing order of criticality or value from top to bottom.

The next step was to identify the capability of the remaining areas on the maps based on a particular combination of soil conditions, slope, and surface drainage. Each of these maps was overlaid successively to determine the various capability classes on each of the seven Land Use Capability Maps. Twelve capability classes ranging from most capable (#1) to least capable (#12) for urban development have been designated. On the capability maps these have been coded appropriately so that they are easily identifiable. To satisfy the request of the state, these twelve classes have been divided into three groups. The dividing points were chosen because in each instance there was a significant enough change in one or more of the resource characteristics (categories) to warrant a division. These groups were identified as follows: Excellent potential for development, (Capability Area 1), Good potential for development (Capability Area 2), and Fair potential for development (Capability Area 3). They are defined below.

Where water and sewer are available the capability of a given area will usually improve. While these factors were not considered in the capability analysis per se, they will provide an essential element in determining "permissible land uses", as discussed in a subsequent section.

This classification system leads to a definition of "permissible land uses" for the coastal zone. Knowing the inherent capability of the coastal zone for urban development, and then assessing the requirements for various land uses, the most appropriate uses can be guided to the most capable area. Industrial development could be appropriately accommodated on Class 3 land (Excellent potential for development) but not on Class 9 land (Fair potential for development).

Land Use Capability Classification

Capability Class	Slope	Soil 1/ Condition	Surface Drainage
Capability Area 1 - Excellent Potential			
1	0-8%	1	Fourth Order
2	0-8%	1	Second, or Third
3	0-8%	1	First; Lake Shore Buffers
Capability Area 2 - Good Potential			
4	0-8%	2	Second, Third, or Fourth
5	0-8%	2	First, or Lake Shore Buffer
Capability Area 3 - Fair Potential			
6	0-8%	3	First, or Lake Shore Buffer
	8-15%	1	Second, Third or Fourth
7	8-15%	1	First, or Lake Shore Buffer
8	0-8%	3	Second, Third, or Fourth
9	8-15%	2 or 3	Second, Third, or Fourth
10	8-15%	2	First, or Lake Shore Buffer
	8-15%	3	Second, Third, or Fourth
11	8-15%	3	First, or Lake Shore Buffer
12	15-25%	1, 2, or 3	Any drainage

Capability Area 4 - Poor Potential (Resource Protection)

1. Floodplains 2/ and/or Wetlands 3/ Highly Erodible Soils 3/
2. Floodplains and prime agricultural land 3/
3. Floodplains ~~—map shows~~
4. Wetlands in Valuable Forest Areas 4/
5. Wetlands
6. Highly Erodible Soils on Steep Slopes 5/

7. Highly Erodible Soils

8. Steep Slopes in Valuable Forest Areas

9. Slopes over 25% 6/

10. Ice-Contact Deposits in Valuable Forest Areas

11. Ice-Contact Deposits

12. Prime Agricultural Soils
    Natural Areas 7/
    Higher Hills 5/

1/ Soil Conditions Groups

1. Sand and Gravelly Soils
   Deep, Well-Drained Stony (non-hardpan) Soils

2. Deep, Well-Drained Stony Hardpan Soils
   Clays and Sands over Clayey Soils

3. Seasonally Wet Soils
   Shallow to Bedrock Soils

2/ S.C.S. 100-year floodplain boundaries and 10 foot boundary for all tidal waters based on Hall (1975), Hayden (1975), and Corps of Engineers (unknown).

3/ S.C.S. Rockingham and Strafford Soil Survey

4/ Brunz and Lane (1969), "A Timber Inventory of the Seacoast Region."

5/ U.S.G.S. 7½-minute quadrangles

6/ Bradley (1964), Geology and Groundwater Resources of Southeastern New Hampshire, Cotton (1974), personal communication

7/ Natural Areas Inventory, Society for the Protection of New Hampshire Forests

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W.P.

WATER USES

CAPABILITY AND LIMITATIONS

WATER USE ANALYSES

WATER USE SUITABILITY ANALYSIS

This water use suitability analysis constitutes a preliminary attempt at the water-related aspects of the "establishment of a method for analysis of the capability and suitability for each type of resource and application to existing, projected, or potential uses." (CZMPAR 923.12 (a) (3)). Also conducted, as a part of this effort was "an inventory of natural and man-made (marine and estuarine) resources." (CZMPAR 923.12 (a) (2)). That inventory work has been included in the first year completion report. (Note: That work included an inventory of existing and potential uses of the New Hampshire coastal zone, the location of potential sand and gravel resources off the New Hampshire coast, and an identification of coastal ecoysystems and response to intrusion by man plus supporting data). Similar efforts have been undertaken for land in the application to the New Hampshire coastal zone of a land-use capability analysis developed by McHarg.

Unlike the land capability model, the water-use suitability model is not based totally on the proposition that the natural environment should significantly determine all future water use. Rather, because of the paucity of detailed data on the marine and estuarine environment, a pure capability analysis is not yet possible. The situation demands that a closer look at existing uses be taken in order to provide an idea of use suitability. That is, due to the unusual number of unknowns in dealing with the marine and estuarine environment, existing uses, which implicity account for the natural factors involved in a usage decision are the basic guide.

To the extent that the free-market economic system dictated existing water uses, these uses implicity account for a large number of furtive economic factors as well, and thus stand as a measure of society's desires as to what water uses should be now, and to some extent in the future.

The development of a rational methodology for water use capability, properly based on detailed scientific data, would require years of effort and hundreds of thousands of dollars. One need only look at the extensive survey work being done to support the location of a single discharge outlet at the Seabrook power plant site to find proof that relatively little is known about the natural capability of the offshore waters to support many of man's uses.

Standing alone, the water-use suitability analysis, and resulting maps, determine suitabilities for tidal marine and estuarine waters only. Existing land uses and capabilities have been surveyed in making these water suitability determinations. Additionally, it should be stated that this analysis represents a totally new application of existing information. As such, it is advancing, rather than approaching, the state of the art. It is not a complete, fully detailed, methodology such as the McHarg analysis for land use capability.

Finally, a note about the applicability of these maps and findings to the New Hampshire Coastal Zone Management program: It is not expected that the results of these analyses will stand alone as absolute guides to decision-making. Under no circumstances should the maps be considered as "zoning" for coastal waters. Such a deterministic use of these work products has not been anticipated by the staff of the Strafford Rockingham Regional Council. The water use suitability analysis can be used as background data to support the development of a coastal

management system in New Hampshire, through use in the definition of permissible water uses, the ordering of relative priorities of water uses and the identification of areas of particular concern. Later use can be made of this information, again as background data and in conjunction with site specific environmental and economic data, to support case by case determinations of the capability of specific land and/or water areas to support proposed uses.

Inventory

The initial step in defining water-use suitability was to inventory the following natural phenomena and man-induced uses of New Hampshire's coastal waters:

1) Coastal ecosystems
2) Marine and estuarine species
3) Bottom sediments - offshore
4) Existing marine uses
5) Potential marine uses

The following maps were prepared and serve to indicate the location of selected coastal resources and existing water uses:

1) Spawning Areas - Major Marine Species
2) Offshore Fishery Areas - Of Importance to New Hampshire
3) Clamming and Oystering Areas (Three maps)
4) Offshore Fisheries - Portsmouth and Gloucester Landings
5) Existing Uses - Offshore
6) Offshore Sand and Gravel Deposits

Additionally, information on adjacent land-uses and capabilities was extracted from coastal zone land-use capability analyses. The New New Hampshire Water Supply and Pollution Control Commission offered

water quality data and assistance in its interpretation.

The natural phenomena and man-induced uses of New Hampshire's coastal waters inventoried during the first-year effort were reviewed to determine: 1) the presence of marine and estuarine resources of potential value to man and 2) what major increases in existing marine and estuarine uses could conceivably occur and what new uses might be introduced into New Hampshire coastal waters in the future. The review revealed that significant increase in the levels of the following existing uses could occur in New Hampshire coastal waters:

1) Commercial fishing/lobstering
2) Recreational fishing/boating
3) Ocean shipping
4) National defense
5) Research and education
6) Cable areas

The following uses are considered a possibility within and in close proximity to New Hampshire coastal waters:

1) Deepwater port
2) Offshore sand and gravel mining
3) Aquaculture
4) Ocean dumping

It was originally felt that, in order to provide a degree of immediate applicability to the New Hampshire Coastal Zone program, the suitability analysis and classification scheme should most directly address these uses. Additional uses have also been included on suggestion of the Office of Comprehensive Planning. These are: anchorage, pipeline, swimming and visual enjoyment.

The major resource areas identified during the first-year effort

were located on the maps submitted to the Office of Comprehensive Planning in June, 1975. Heavy consideration was given to these throughout the analysis.

Classification System

Orginally, it was felt that numerical indicators of use intensity and resource availability would be used whenever possible in making suitability classifications. It was soon evident, however, that numerical data was (except in isolated cases) either spotty, outdated, or nonexistent. Assessing suitability became a more subjective problem.

The possibility of suitability classification on the basis of resource-usage conflicts was suggested. Review by SRRC staff revealed that all present or potential uses identified for inclusion in this analysis posed conflicts of multiple resource use with at least one other use, and little pro-ress towards water use suitability classification could be made on this basis alone. This concept of resource analysis was retained for the determination of priority of uses, however.

It was determined at the outset by the New Hampshire Office of Comprehensive Planning that, primarily for purposes of graphic clarity, there would be four suitability areas established for coastal waters. These areas were identified in a preliminary manner as ranging from areas of "least development potential" to areas of "good development potential." Staff efforts at working with these four areas were an attempt to identify a series of subjective parameters which could be used in the determination of water use suitability, given the inventory data available. The parameters shosen represents the staff's best estimate of key determinants of the suitability of coastal waters for supporting some or all of the diverse uses being considered.

Parameters chosen to separate New Hampshire coastal waters into suitability areas included the following:

1) Location and intensity of existing coastal and estuarine water uses
2) Presence or proximity of marine and estuarine resources of value to the natural environment (e.g. salt marsh habitat, rocky shores habitat)
3) Existing land uses adjacent to these areas and capability of adjacent lands for supporting development
4) Presence of marine and estuarine resources of potential value to man, either industrially, commercially or recreationally (including lobsters, finfish, sand and gravel, water depth and bottom type suitable for offshore structures).
5) Expected impact on coastal waters and adjacent land of possible future uses of coastal and estuarine uses either in, or in close proximity to, waters under New Hampshire control. This includes increased intensity of present uses as well as the introduction of new uses.
6) Presence of physical restrictions on development and use (shallow water depths, bridges, currents)
7) Existing water quality and subsequent limitations on water use.

These parameters were chosen by the staff of the Strafford Rockingham Regional Council, with some alterations suggested by the New Hampshire Office of Comprehensive Planning.

The suitability classification system was based primarily on the seven identified parameters and was designed to apply as uniformly as possible to those water uses identified earlier. Uniform application to both marine and estuarine coastal waters was considered a desirable goal of this process.

Classifications have been extended beyond simple "development potential." They include an "intensity of use" component as well. It was felt that to be confined to development potential alone would have resulted in great loss in generality of the suitability model.

(Note: The term "development" has been applied to those uses requiring significant physical alterations to coastal waters and submerged lands beneath. This might include industrial uses such as sand and gravel dredging, the construction of mooring structures, pleasure boat docking facilities, and so forth. "Intensity of use", however, is more general, applying to those uses which do not result in significant physical alteration to coastal lands and waters. Extraction of renewable living marine resources, swimming, and much boating fall into those activities controlled by the "intensity of use" category.)

The following constitute the four suitability classes and a brief characterization of each. Characterizations are made to conform to the seven parameters listed earlier. These are recounted for convenience:

1) Location and intensity of existing coastal and estuarine water uses.
2) Presence or proximity of marine and estuarine habitats of significant value to the natural environment.
3) Existing land uses adjacent to these areas and capability of adjacent lands for supporting development.
4) Presence of marine and estuarine resources of potential

value to man, either indirectly, commercially or recreationally.

5) Expected impact on coastal waters and adjacent land of possible future coastal and estuarine uses either in, or in close proximity to, waters under New Hampshire control. This includes increased intensity of present uses as well as introduction of new uses.

6) Presence of physical restrictions on development and use (shallow water depths, bridges, currents).

7) Water quality.

The suitability classes may be characterized as follows:

Class IV - Poor development potential/low-use intensity

1) Existing water uses generally of low intensity, and generally confined to recreational boating, fishing, and shellfishing when they exist.

2) May be located in or adjacent to estuarine, salt marsh, or rocky shores habitat, or other ecologically sensitive areas.

3) Adjacent land generally falls into the "poor" development capability class, into the resource protection class, or may be identified as an area of particular concern.

4) Either supports living marine resources such as finfish, lobsters, and shellfish, or provides habitat for them, such as worm-clam flat or oyster-mussel reef. (Complements item 2) above). Over-exploitation of resources possible in this area, should be guarded against.

5) Impacts on natural and man-induced uses of coastal waters, either from the introduction of new uses by man, or an increase in the intensity of existing uses by man, may be termed "direct and significant" under procedures presently being developed by the Office of Comprehensive Planning.

6) Water depths, bridge obstruction and/or currents may contribute to existing low usage levels.

7) Water quality class A, B, C, or D.

Class III - Fair development potential/moderate-high use intensity

1) Existing water uses may be of moderate-high intensity, and generally confined to recreational boating, fishing and shellfishing. Mooring and docking facilities may exist.

2) May be located in, or adjacent to, estuarine, salt marsh, or rocky shores habitat if existing uses do not generally result in "direct and significant" impact. Some potential for increased intensity of use exists.

3) Adjacent land may already be classified as urban, open-space for preservation and recreation, or as having at least poor development potential.

4) Harbors living marine resources of value to man, such as finfish, shellfish, lobsters. Non-living resources of concern may be present. Overexploitation of living resources possible.

5) Impact by uses in this zone on coastal waters and adjacent land uses may be "adverse", but not large

enough to be termed "direct and significant." This may be largely because the tolerance of systems receiving the impact is higher or because of the nature of adverse effects emanating from uses.

6) Water depths, bridge obstructions, currents, generally admit of recreational and small commercial boat usage and/or shellfishing at various tidal levels.

7) Water quality class A, B, or C.

Class II - Good development potential/moderate-high use intensity

1) Existing uses typically the same as in area II, with additional usage by ocean-going vessels and traffic headed to or from national defense facilities. May be used for anchorage of large vessels.

2) Distance from ecologically important areas (e.g. salt marsh, rocky shores) ameliorates most impacts from existing uses. Offshore spawning areas are not significantly affected by existing uses. Future uses could have adverse effects -- significance to be determined on a case by case basis.

3) Where in close proximity to land, land is generally classified as of "fair" to "good" development potential. Adjacent land uses may be directly tied to marine waters, either for transportation purposes or the presence of unique resources.

4) Offshore waters generally harbor commercially extractable finfish, shellfish and crustaceans. River and estuarine areas serve as migration pathways for anadromous fish; life support provided to finfish, shellfish and crustaceans. Overexploitation of living resources possible.

5) Impact on coastal waters and adjacent lands from increase in level of existing activity probably not significant, in light of value of these areas to man for transportation and reasonable resource extraction. The introduction of major new uses could have potentially direct and significant impacts, and should be handled on a case by case basis.

6) Physical features, primarily bathymetry, allow for generally unrestricted navigation. Some obstructions applicable to particular uses, such as deepwater port or sand and gravel mining, may exist in certain subareas of this zone.

7) Water quality class A or B offshore; A, B, or C in river areas.

Class I - Excellent development potential/moderal-high use intensity

1) Existing use typically the same as area II, though at less intense levels for recreational boating and fishing. Shellfishing (primarily for scallops) has occurred in the past, but is not a significant activity in this zone.

2) Distance from ecologically important coastal areas (salt marsh, rocky shores) ameliorates most impacts from

existing uses. Offshore spawning areas may be present, but direct impacts from existing activity appear slight. Future uses could have adverse impacts - significance to be determined on a case by case basis.

3) Distance from land (at least 14 miles) diminishes importance of adjacent land use in classifying this capability area. Potential future uses (such as a deepwater port or sand and gravel dredging) may require adjacent onshore land suitable for support and/or processing facilities.

4) Harbors living marine resources of value to man, including finfish, shellfish, and crustaceans. Non-living resources confined to sand and gravel. Over-exploitation of living resources possible.

5) Impacts on coastal waters and adjacent lands from increases in levels of existing activity are probably not significant. The introduction of major new uses could have potentially direct and significant impacts on both water and land and should be handled on a case by case basis.

6) Physical features allow for generally unrestricted navigation. Water depth reduces chances of grounding of deep-draft vessels. May be too deep for certain activities (sand and gravel mining).

7) Water quality class A or B.

Several items pertaining to the use of these classification characteristics should be noted. First, the transition between one

capability area and another is nowhere near as abrupt as a line on a map: pollution levels change gradually, depths change gradually, vegetation alters slowly, composition of marine life alters gradually, to name but a few of the transitions that take place.

Second, the designation of suitability areas will remain approximation of reality and not reality itself. In fact, large-scale inclusions of areas not fitting the parameters of a given suitability class will occur as a matter of course. These do not detract from the usefulness of the map as background data for CZM program development but makes an extension to a hard and fast zoning concept indefensible.

Third, tides in the vicinity of eight feet occur throughout the seacoast region of New Hampshire. Thus, an area which might have water depths too shallow for use by boats at low tide may be perfectly useable at mid or high tide.Use assumptions were made based on midtide water depths. This was complemented by consideration of alternative low tide uses (such as shellfishing) as well.

Fourth, the parameters chosen do not adequately represent intertemporal changes. The coastal environment is dynamic. In the water, sand bars may appear and disappear during the course of a winter; changes in water depth through silt deposits may occur. Adjacent land use may change. Needs and desires of society change as well. Water-use suitability analysis is static. It does not change with the changing environment. Continual reassessment and updating of the model is necessary for it to remain useful.

Finally, this analysis only accounts for what activities a given water area might be suitable for supporting. It does not deal with how those activities might be conducted or in what manner they should or could be regulated. The suitability of a water area for supporting a

given use is changed radically as the adverse impacts of that use are ameliorated either through technology or prudent use. Strict application of the suitability classifications would result in a rigid system which, unless applied on a case by case basis and as one factor of many to be considered, may have only limited applicability to sound coastal resource management.

Analysis and Classification

Given the parameters identified earlier and the information available from the first-year inventory effort, an analysis was undertaken which resulted in the placing of New Hampshire marine and estuarine waters into one of four suitability classes.

Though all parameters were considered equally, certain of them were found to be more restrictive outright than others. For example, a class D water quality classification carries with it a description of "Aesthetically acceptable. Suitable for certain industrial purposes, power and navigation" (See Staff Report No. 67 of the New Hampshire Water Supply and Pollution Control Commission, "Piscataqua River and Coastal N.H. Basins -- Water Quality Management Plan", p I-2) Such water is not deemed acceptable for recreational boating and fishing. Thus, class D water was placed into the low development potential/low use intensity category. Physical restrictions such as low water depths, bridges, and similar obstructions would also strongly affect the suitability classification afforded a particular body of water. The other parameters allowed more latitude in interpretation.

The following is a general description of the suitability areas by locale, and presents some of the more important reasons for such classification:

Offshore Waters

An approximate two mile buffer strip, classified as

"Class III" lies adjacent to all coastal areas and the Isles of Shoals. (RSA 211:49, Subparagraph I, restricts certain types of dragging within two miles of shore. RSA 211:49, Subparagraph II restricts traps and weirs and certain other equipment in waters under state jurisdiction during summer months. These provide a basis for the buffer zone being two miles wide.) Additionally, these areas are subjected to shore and adjacent areas of high recreational value restricts the use of a higher classification.

Particular note is made here of the fact that the waters surrounding the Isles of Shoals has been placed in suitability class III -- which effectively removes them from consideration as a site for a deepwater port. The Office of Comprehensive Planning suggested that further consideration be given to the classification, particularly as it related to the establishment of a fixed port on or near the Isles of Shoals.

A fixed port on or near the Isles of Shoals is not considered feasible for a number of reasons. First, the construction costs of such a facility would be greatly higher compared with other feasible alternatives such as a single-point mooring system. Significant dredging and blasting of bedrock to make the area immediately adjacent to the Isles of suitable depth to handle supertankers would be necessary. This would be both expensive compared to the single-point mooring alternative and would result in significant damage to the marine environment. Little advantage as compared to a single-point mooring would be obtained from this additional expense, even if one were considering a facility capable of loading tankers with refined product following onshore processing.

The facility would be visible from virtually the entire New Hampshire seacoast. It would appear likely that some decrease in income of the tourist industry would occur. Additionally waters surrounding the

Isles of Shoals are intensely fished for recreational purposes and commercially trapped for lobster. Reduction in these activities would occur. It is certain that use of the Isles as a convention and educational center would decrease, if not stop completely. Also, proximity to shore (five to seven miles), when coupled with existent current patterns off the New Hampshire coast, indicate that a significant chance of oil spills making landfall along the New Hampshire coast exists.

Some guidance is available from the federal government for not deeming waters in the vicinity of the Isles of Shoals suitable for deepwater port development of any type, let alone a facility located on the Isles themselves. The Region I office of the United States Environmental Protection Agency has stated:

> "(Supertanker) port facilities should be located some distance from the coast -- between 10 and 25 miles -- and in areas assuring freedom from navigational hazards, protection of unique environmental values, and having the capability to absorb or contain oil spills. We favor a monobuoy type system where tankers could unload crude oil offshore and have it piped underground to refineries onshore...."
>
> EPA Region I policy statement on refineries and deepwater ports in New England

Make note that the classification of the waters surrounding the Isles is of only fair development suitability does not constitute a flat rejection of the concept of a deepwater port in waters off the New Hampshire coast. Such a facility has, in fact, been considered as a possibility in waters designated as suitability class I, yet to be discussed.

Suitability class II designations have been made further offshore, an area presently used by a number of interests, including ocean shippers recreational and commercial fishermen, and the federal government. Here, depths are more amenable to ocean shipping, few restrictions are

placed on commercial fishing, and generally fewer recreational boaters and fishermen are present, lowering chances of conflict over use of the water surface. Distance from adjacent land and the less critical nature of natural systems in this area reduces the chance of significant adverse impact from heavier uses. Much of this area is in waters under federal jurisdiction.

At a distance of approximately 14 miles, a class I designation was made. Present intensity of use in the area might be termed moderate to low. Concentrations of finfish and crustaceans occur in specific areas, but adverse impacts on these resources may be ameliorated by proper review of siting for certain major developments, such as a deepwater port or sand and gravel mining. The 14-mile distance from shore results in this area being substantially away from inferred spawning areas for cod, pollock, and silver hake. The distance from shore also will reduce many direct impacts of operation or construction of major facilities, at least when taken from a coastal perspective. These would include visual impacts as well as physical impacts on the coastal environment.

Hampton-Seabrook Harbor Area

Much of the Hampton-Seabrook Harbor area has been designated as suitability class III. Key determinants in this decision were the existence of a large recreational and commercial fleet, the presence of heavily utilized shellfishing flats, and the existence of nearby land of state and locally supported recreational facilities. Additionally, many physical restrictions on navigation in the harbor area proper have been removed by dredging accomplished by the U.S. Army Corps of Engineers.

It is in the harbors and estuaries that the problem of tidal variation enters into the suitability classification picture. Hampton-

Seabrook harbor is no different. At high tide, virtually all of the harbor can be traversed by boat traffic. At low tide, many tidal flats are exposed, making much of the area unsuitable for boating. Yet at the same time these areas are valuable as a resource for shellfish extraction. In this case, a prime determinant of an area II classification in the main portion of Hampton-Seabrook harbor was existing intensity of use -- which is high.

Further up the tributaries to the main harbor area (Hampton and Taylor Rivers, Blackwater River, Mill Creek and Brown River) the classification changes to Class IV. In these cases, the proximity to highly vulnerable saltmarsh habitat, the shallow depth of waters and general inaccessibility to small craft, and value of the area as a spawning and nursery area all combined to justify class IV designation.

Portsmouth and Rye Harbor Area

Class II, III, and IV designations are all accorded to various waters in this area. The most prominent inclusion is that of class II from offshore into and up the Piscataqua River. The distinction in this case is primarily made to account for ocean shipping traveling to and from industrial facilities and national defense facilities located along the Piscataqua River. Natural systems in the river (generally high-velocity ecosystems) are less diversified and relatively less supportive of natural systems than tidal marsh areas, for example. The Piscataqua retains one natural function of paramount importance, however -- that of serving as the single entryway from Great Bay to the ocean, and its importance cannot be downgraded.

The Piscataqua River as far west as Newington is bordered by land capable of supporting industrial facilities, and the transportation link to the ocean is of high value to New Hampshire. The U.S. Army Corps of Engineers has maintained a channel dredged to 35 foot depth.

Class III designations are afforded Little Harbor and the lower stretches of Sagamore Creek as well as Rye Harbor. Also, the North Mill Pond in Portsmouth has retained that classification. Key to classifying these areas has been their value as mooring and docking areas for recreational and commercial boats. Existing use is generally intensive. Occeasional areas of shellfish are located in the Little and Rye Harbor vicinity as well. These areas are generally surrounded by urban areas or areas designated as open space for preservation, land uses particularly amenable to a class III designation.

Tributaries emptying into Rye Harbor (numerous creeks) and Little Harbor (upper reaches of Sagamore Creek, Witch Cr-ek, Seavey Creek and Berry's Brook) are generally surrounded by open space lands and tidal marsh. Some urban land, although not much, is found as well. Additionally, Berry's Brook has been identified as maintaining a unique population of sea-run brook trout. All of these areas have, therefore, been characterized as suitability class IV.

Great Bay, Little Bay and Tributaries

By far the most complex area to categorize is the Great Bay-Little Bay complex, along with its tributaries. A multitude of variations of water quality, water depth, and surrounding land capability classifications are present. Suitability for supporting boating uses varies greatly with the tides, but the situation is not unlike the Hampton-Seabrook Harbor area where suitability for one use (boating) changes to another (shellfishing) with the tide. Resolution of the problem is similar.

Most of Great Bay and Little Bay proper has been classified as suitability class III. Key determinants in this are existing uses (largely confied to recreational boating and fishing, with some low-level commerc ial lobstering in Little Bay) and adjacent land capability

(largely resource protection districts such as wetlands, floodplains, and steep slopes). Lower portions of the Lamprey River, Squamscot River, Oyster River, Bellamy River, and Piscataqua River have been similarly categorized.

No areas have been categorized as class I or II. Physical restrictions (depth, tidal currents) and higher value of contained resources in other uses are primary determinants of this.

Class IV designations have been made for the following regions: Winnicut River, Squamscot River above the B & M railroad bridge, upper areas of the Lamprey River, Crommet Creek, the Johnson Creek estuary (adjacent to the Oyster River), upper reaches of the Bellamy River and upper reaches of the Piscataqua River, (Note: classifications apply to tidal portions only).

Reasons for class IV designation was made primarily because of adjacency to ecologically sensitive areas. The Winnicut River valley (which has class D water as well) is an important anadromous fish run, and is an important wildlife habitat. The area in the vicinity of Adam's Point and Crommet Creek is estuarine with salt marsh and rare plant species, including flowering dogwood. The Johnson Creek estuary in Durham (off of the Oyster River) is an unspoiled tidal estuary which supports a number of rare plants. Physical restrictions to navigation and adjacent land in the resource protection class also contributed to area I designations. No complelling reasons for higher classification were found among the other parameters surveyed.

W.P.

PERMISSIBLE USES - PRIORITY OF USES IN THE COASTAL ZONE

Prepared by
Strafford Rockingham Regional Council

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Preface

This report was prepared in satisfaction of a contract between the Strafford Rockingham Regional Council and the Office of Comprehensive Planning.

It discusses permissible land and water uses and the priority of various uses for various places in the coastal zone.

It should be understood throughout that there are many varieties of coastal lands and waters. They cannot be rigidly categorized into four types each. The recommendations here presented should be viewed as guidance to those using coastal areas, not commandments.

Moreover, it should be recognized that the uses have been viewed as utilizing "average" technology. Advanced engineering, or new technology, can make "prohibited" uses permissible. And, likewise, failure to utilize currently accepted good construction or operating practices may render some uses, listed here as "permissible", highly objectionable. Furthermore, effects on areas of particular concern must be considered in any decisions.

Here follows:

1) Permissible land uses

2) Permissible water uses

3) Priority of uses: Land - Water

Permissible Land Uses

Identification of permissible land uses by coastal sub-zone and capability area follows logically from the land use capability analysis. This identification process represents the initial step in determination of priority of uses.

The capability analysis concentrated on the most appropriate locations for urban development only in a general way. Assessment of the impacts and requirements of existing uses, however, (see Figure 1), makes it possible to identify the capability of more specific uses in defined geographical areas (capability areas). Using in part the language of the Coastal Zone Management Program Regulations (Paragraph 923.12 12 (b) (iii)), the following criteria were utilized in determining permissible uses. "Those uses which:

-can be reasonably and safely supported by the resources of the coastal zone;

-can be sustained without undue impact on the coastal environment;

-are compatible with the coastal environment and/or are appropriate to coastal areas."

In attempting to assign permissible uses to the various capability areas, it became immediately clear that certain uses are compatible in all of the defined capability areas, whereas others are appropriate in only the "Excellent" or "Good" capability areas. A hierarchy of uses can be identified, where those with the most restrictive requirements, or the greatest potential impact, are assigned to those capability areas most able to sustain the given use (Excellent or Good). Commercial and industrial uses are an example. Conversely,

Figure 1

Some Criteria for Determining Allocation of Permissible Land Uses

Use	Criteria
Sand and Gravel Extraction	-Locations that possess a suitable gravel resource -Adequate berm and vegetative buffer -Provision of suitable reclamation plan -Access to major transportation routes
Light Industry (Industrial Park)	-Compatibility with surrounding area -Availability of access to major transportation routes -Open space and vegetative buffers -Relatively flat land -Land suitable for heavy building sites -Consistent with sewer development phasing -Site free from flood or other hazards
Heavy Industrial	-Large, relatively flat sites -Proximity to major transportation routes -Adequate buffer for minimization of negative impact on other surrounding land uses -Land suitable for heavy building sites -Land free from flood or other hazard -Consistent with sewer development phasing
Commercial and Office	-Size consistent with market demand -Location conducive to convenient access -Consistent with sewer phasing -Relatively leve, hazard free locations suitable generally for heavy building sites
Institutional	-Land suitable for the facility required -Location near adequate circulation route -elimination of negative impact on surrounding land use
High Density Residential 4 DU/acres or greater	-Market demand -Slopes under about 10% -Land free from slide, flood and excessive erosion hazard -Consistent with sewer phasing -Location near arterial circulation routes -Location on promontory sites -Land suitable for homesites or heavy buildings
Medium Density Residential 1-4 DU/acres	-Market demand -Slopes up to 15% pending analysis -Land free from slide, flood and excessive erosion hazard -Consistent with sewer phasing -Land suitability for homesites

Figure 1 - Continued

Low Density 1 less than 1 DU/acres	-Market demand -Approval on steep slopes subject to land analysis
Agriculture	-Relatively level land -Productive soils -Limitations for more intensive uses such as peat bogs and floodplains
Park and Recreation	-Need for recreation facilities -Availability of scenic or other amenities -Protection of areas highly suitable for conservation

those uses with the least potential impact are more appropriate in the areas less capable of supporting development. Agriculture and recreation are appropriate here. These uses can also be considered for the less limiting capability areas where there is no conflict with the more intense uses.

Before assigning the appropriate permissible uses to each of the capability areas, it is important to note that this is basically an organizational exercise. It is not intended to be used as a final guide for controlling uses by capability area. Several factors support this qualification.

The designation of uses was based on analysis of their impacts and the capability of coastal resources to sustain them. In some instances a given use is inappropriate in a certain area. If it can be demonstrated, however, that by proper design and site modifications, a given use overcomes the limitations (slope, high bedrock, etc.) of the capability area, it should be allowed. In addition, the waters which receive effluent are not uniform. Since impacts can best be measured by changes in water quality, location of land uses can be very important. Unlike freshwater lakes with a more predictable response to a particular impact, the ability of estuaries and salt water bodies to assimilate pollutants is a direct function of dilution rates. Since there are so many factors which determine the dilution rate, it is difficult to predict the impact of a given use on coastal water from one geographic area to the next, even if the use occurs in the same capability area.

Finally, both the capability areas and the coastal zone sub-zones (primary, secondary, and tertiary) are not defined specifically by boundaries sensitive to the micro-features of the land (slope, hydrology, soil types, etc.). The capability areas are aggregated from

specific site classes in the process; these areas have become generalized. Some uses generally appropriate for a capability area may not always be so, because of the fact that in the generalized areas there are different conditions. Specific reviews are therefore sometimes necessary.

The following list of uses was used in a determination of permissible uses. Within a specific area the permissible uses were designated either as (1) Permitted by Right or (2) Permitted by Review. (Review would be by a coastal management agency). "Review" indicates those uses, which while appropriate in a given area, might have an adverse environmental impact. Where the use was not listed it was considered "not permissible."

Uses Listed

Low density residential 1 dwelling unit (DU) or less less/acre

Medium density residential 1-4 DU/acre

High density residential 4 DU/acre

Commercial and Office

a. Motels
b. Restaurants
c. Other tourist related commercial

Light industrial (industrial parks)

Heavy industrial

Sand and gravel extraction

Waste disposal

Intensive recreation (parks, playgrounds, sports fields)

Extensive recreation (trails, bikepaths, hunting, etc.)

Marine-related uses (marinas; boat-launching ramps; boat rental, repairs, and sales)

Transportation and utilities

Agriculture

Forestry (forest management)

Wildlife habitat (wildlife management)

Water supply

Primary Zone

Poor (Area 4)

1. Uses permitted by right.

   a. Extensive recreation (trails, bikepaths, hunting, etc.)
   b. Agriculture
   c. Wildlife habitat (wildlife management)

2. Uses permitted by review.

   a. Water supply
   b. Marine-related uses (marinas; boat-launching ramps; boat rental, repairs and sales)
   c. Transportation and utilities
   d. Forestry (forest management)

Fair (Area 3)

1. Uses permitted by right.

   a. All of those in "Poor"
   b. Low density residential 1-dwelling unit (DU) or less less/acre
   c. Medium density residential 1-4 DU/acre
   d. High density residential 4 DU/acre
   e. Commercial and Office
      1. Motels
      2. Restaurants
      3. Other tourist related commercial

2. Uses permitted by review.

   a. Light industrial (industrial parks)
   b. Heavy industrial
   c. Sand and gravel extraction
   d. Waste disposal
   e. Intensive recreation (parks, playgrounds, sports fields)

Good (Area 2)

1. Uses permitted by right.

   a. All of those in "Poor"
   b. Those uses permitted by right in "Fair"
   c. Intensive recreation (parks, playgrounds, sports fields)

2. Uses permitted by review.

   a. Light industrial (industrial parks)
   b. Heavy industrial
   c. Sand and gravel extraction
   d. Waste disposal

Excellent (Area 1)

1. Uses permitted by right.

   a. All of those in "Poor"
   b. Those uses permitted by right in "Fair" and "Good"

2. Uses permitted by review.

a. Light industrial (industrial parks)
b. Heavy industrial
c. Sand and gravel extraction
d. Waste disposal

Secondary Zone

Poor (Area 4)

1. Uses permitted by right.

a. Extensive recreation (trails, bikepaths, hunting, etc.)
*b. Marine-related uses (marinas; boat-launching ramps; rental, repairs, and sales)
c. Agriculture
d. Forestry (forest management)
e. Wildlife habitat (wildlife management)
f. Water supply

*Marine related uses while permissible, do not logically "fit" in this area.

Fair (Area 3)

1. Uses permitted by right.

a. All of those uses in "Poor"
b. Low density residential 1-dwelling unit (DU) or less less/acre
c. Medium density residential 1-4 DU/acre
d. High density residential 4 DU/acre
e. Commercial and Office
    1. Motels
    2. Restaurants
    3. Other tourist related commercial
f. Light industrial (industrial parks)

2. Uses permitted by review.

a. Heavy industrial
b. Sand and gravel extraction
c. Waste disposal

Good (Area 2)

1. Uses permitted by right.

All of those in "Poor"
Those permitted by right in "Fair"

2. Uses permitted by review.

Heavy industrial
Sand and gravel extraction
Waste disposal

Excellent

1. Uses permitted by right.

   All of those in "Poor"
   Those permitted by right in "Fair"

2. Uses permitted by review.

   Heavy industrial
   Sand and gravel extraction
   Waste disposal

Tertiary Zone

Poor (Area 4)

1. All uses permitted subject to state and local regulations. Only large uses of water (heavy industry) should be subject to review.

Fair (Area 3)

Same as "Poor"

Good (Area 2)

Same as "Poor"

Excellent (Area 1)

Same as "Poor"

PERMISSIBLE WATER USES

The designation of permissible water uses by geographic area in the New Hampshire Coastal Zone follows logically from the water suitability analysis. Indeed, existing water uses played a significant part in the development of the suitability classifications. Thus, it is difficult to separate the two.

Present uses posed little problem - they were all designated as permissible in the areas in which they presently occur. Where it was anticipated that there would be demand for increased levels of certain uses, these were analyzed with respect to the four suitability classifications. Determinations of permissibility were made according to expected increases in levels of impacts these uses might have at higher intensity.

Anticipated future uses posed more of a problem. For these, the inventory effort was geared towards obtaining data which would measure the extent of impacts which these would have on coastal waters and on other uses of those coastal waters. For example, data on navigation restrictions associated with a deep-water port was surveyed along with data pertaining to chances of a spill making landfall from certain locations offshore. Certainly, these provide some guide to the determination of permissible water uses and this information has been reflected in suitability area determinations.

For example, research uncovered that at a ten to fifteen mile distance from shore, the visual impact of a deepwater port itself was almost zero and the visual impact from tankers greatly lessened from one closer inshore. The chance of a spill hitting shore decreases from 50 percent at five miles from shore to less than 20 percent at

15 miles from shore. Additionally, large surface acreage would be denied to other uses, a factor which would tend to mitigate against locating such a facility in a high use area. A statement could thus be made that a deepwater port, say, less than five to ten miles from shore is, therefore, not permissible, while one at perhaps 15 miles or greater could not be rejected out of hand given present evidence. Associated pipelines running to shore, a necessary portion of such a facility, were not rejected either, partly because of their importance to a deepwater port project and partly because there are indications that effects associated with pipeline construction are transitory. Similar subjective analyses were conducted for each of the potential uses and expansion of present uses. Together they determined suitability classifications and permissible uses in geographic areas.

The uses considered for designation as permissible by suitability area are the following (these are represented by those existing and potential uses identified during the first-year inventory effort, plus additional suggestions by the Office of Comprehensive Planning which are starred):

Anchorage*

Aquaculture

Cable areas

Commercial fishing/lobstering

Deepwater port (including single point mooring facilities)

National defense

Ocean dumping

Pipeline*

Recreational fishing/boating

Research and education

Sand and gravel mining

Swimming*

Visual enjoyment

The following is a summary of permissible uses by suitability area, according to best knowledge of existing water activities and anticipation of future activities. The list is subject to change as more data becomes available.

Area IV

Aquaculture (open-range)

Commercial fishing/lobstering

Recreational fishing/boating (including shellfishing) (low intensity and in other than class D waters for fishing and shellfishing)

Research and education

Swimming (low intensity and in other class D waters)

Visual enjoyment

Area III

Anchorage (small vessels only)

Aquaculture (fixed and open-range)

Cable areas

Commercial fishing/lobstering (including construction of supporting mooring and docking facilities)

Pipeline (in conjunction with deep-water port)

Recreational fishing/boating (including shellfishing) (moderate-high intensity, including construction of supporting mooring and docking facilities)

Research and education

Swimming

Visual enjoyment

Area II

Anchorage (including ocean-going vessels)

Aquaculture (fixed and open-range)

Cable areas (where necessary)

Commercial fishing/lobstering

Pipeline (in conjunction with deep-water port)

Recreational fishing/boating

Research and education

Shipping

Swimming

Visual enjoyment

Area I

Anchorage

Aquaculture (fixed and open-range)

Cable areas

Commercial fishing/lobstering

Deepwater port

Ocean dumping (with federal permit)

Pipeline (in conjunction with deepwater port)

Recreational fishing/boating

Research and education

Sand and gravel mining

Shipping

Visual enjoyment

National defense activities are permitted in each of the above areas. It is anticipated that large-scale changes in levels of national defense activities will be discussed between states and federal officials.

Note that a permissible designation at this point in the development of the management program should not constitute a carte-blanche approval of such activities. Neither should a non-permissible designation be considered an outright rejection. The right of review and appeal should be retained by all interested parties, and the possibility of case by case review must be considered.

PRIORITY OF USES

Introduction

This portion of the analysis deals with the recommendation of "priority" uses of land and water within specific geographic areas throughout the coastal zone." It builds on the land and water use analysis and the permissible land and water uses by area, developed earlier. Land and water use priorities are listed for all identified permissible uses and are categorized by area. Particular attention is paid to those uses of lowest priority.

Accomplishment of the identification of land and water use priorities was made by first consulting applicable regulations and guidelines issued by the federal Office of Coastal Zone Management. Appropriate portions of Public Law 92-583, the Coastal Zone Management of 1972, were consulted as well. Additional input was provided by the Office of Comprehensive Planning, which identified several considerations which were to be included in the determination of priority of water uses. Strafford Rockingham Regional Council staff added to this the information developed from the aforementioned land and water use analysis.

Federal Guidelines

The Coastal Zone Management Act of 1972 (PL 92-583) as well as final rulemaking on Coastal Zone Management Program Development Grants (15 CFR § 920ff) and Coastal Zone Management Program Administrative Grants (15 CFR § 923 ff) were consulted in order to develop an understanding of federal intent as to the content of a priority of uses methodology. The following paragraphs describe applicable passages of these documents.

Section 305 (b) (5) of Public Law 92-583, the Coastal Zone Management Act of 1972 makes the following reference to guidelines for determining priority of uses within specific geographic areas throughout (New Hampshire) coastal zone:

> "Such management program shall include ... broad guidelines on priority of uses in particular areas, including specifically those of lowest priority."

According to 15 CFR 920.15 (contained within "Coastal Zone Management Program Development Grants -- Final Rulemaking"), priority guidelines will serve three purposes:

> "a) To provide the basis for regulating land and water uses in the coastal zone.
>
> b) To provide the state, local governments, areawide/regional agencies, and citizens with a common reference point for resolving conflicts, and
>
> c) To articulate the state's interest in the preservation, conservation, and orderly development of specific areas in its coastal zone."

Further elucidation on developing guidelines on priority of uses comes from 15 CFR 923.14 (contained within "Coastal Zone Management Program Administrative Grants -- Final Rulemaking"). This reference requires that the following be accomplished:

> "The management program shall include broad policies or guidelines governing the relative priorities which will be accorded in particular areas to at least those permissible land and water uses identified pursuant to § 923.12. The priorities will be based upon an analysis of state and local needs as well as the effect of the uses on the area. Uses of lowest priority will be specifically stated for each type of area."

OCP Guidelines - Water

On July 25, 1975, the New Hampshire Office of Comprehensive Planning and the Strafford-Rockingham Regional Council reached agreement on a series of guidelines which would aid in the development of water-use priorities. These guidelines are summarized as follows:

a) A "resource analysis" approach was to be used. A matrix was to be developed with identified water-uses arrayed against various resources existent in coastal waters.

b) Potential conflicts over the use of various coastal resources were to be identified for the use listed in the matrix. These would be indicated by a check in the appropriate box.

c) The following criteria were to be used in making priority of use determinations:

   1) Where no conflict over resource is involved, the particular use would be the priority use.

   2) Where there is a conflict as to the use of resources, the use dependent upon the resource would be the priority use.

   3) Where two or more uses are dependent upon the same resource, the conflict would be resolved based upon the national interest, economic need, health, safety, and welfare.

These criteria were to be expanded upon by Strafford-Rockingham Regional Council staff as necessary to ensure continuity.

In addition to the above, the following criteria were broadly considered in determining land uses:

1. State and local needs (specifically adequate housing, enough jobs and a livable environment)
2. The ability of a given capability area to sustain a particular use. This follows from the designation of permissible uses.
3. The resolution of potential use conflict in the same resource area.

The Act is clearly concerned with the management of uses that have a direct and significant impact on coastal waters. It is reasonable to assume that the majority of such uses will occur in the primary subzone. There is already intense competition for the use of this area for a variety of uses. Based on the previously stated criteria and the inherent geographic character of this zone, certain uses immediately become of high priority. Marine-related or marine dependent industrial and commercial uses are of high priority. Commercial-recreation uses are also of high priority. While the groupings may not reflect these specific types of uses, they are implied. Part of what makes this zone of particular interest is the convergence of valuable natural and ecologically sensitive resources. Thus, while it is important to provide for the needs and priority uses of the primary zone, the land uses to meet these needs require certain performance standards to prevent environmental degradation. Priority uses are recommended with this qualification in mind.

It would be an exercise in futility to rank order each use for a given capability area and coastal subzone. In fact the Act calls only

for "broad guidelines on priority of uses" (CZM 305 (b) (5)). Rather the permissible uses were ranked into groups of high, medium, and low priority. Where uses were considered non-permissible, they were deemed to be of "lowest priority".

Having grouped permissible uses by capability area and coastal subzone, in accordance with previosly stated criteria, it is logical to use these same groupings for priority uses. Next to each use, one of the following symbols was placed:

high priority	+
medium priority	-
low priority	0
not permissible	N

Permissible Land Uses

Primary Poor

N	Low density residential 1-dwelling unit (DU) or less less/acre
N	Medium density residential 1-4 DU/acre
N	High density residential >4 DU/acre
N	Commercial and Office
	a. Motels b. Restaurants c. Other tourist related commercial
N	Light industrial (industrial parks)
N	Heavy industrial
N	Sand and gravel extraction
N	Waste disposal
N	Intensive recreation (parks, playgrounds, sports fields)
+	Extensive recreation (trails, bikepaths, hunting, etc.)
+	Marine-related uses (marinas; boat-launching ramps; boat rental, repairs, and sales)
O	Transportation and Utilities
O	Agriculture
-	Forestry (forest management)
+	Wildlife habitat (wildlife management)
+	Water supply

Permissible Land Uses

Primary Fair

\+ Low density residential 1-dwelling unit (DU) or less

0 Medium density residential } 1-4 DU/acre less/acre

Commercial and Office

- +a. Motels
- +b. Restaurants
- +c. Other tourist related commercial

\- Light industrial (industrial parks) } Marine related gets +

\- Heavy industrial

\- Sand and gravel extraction

\- Waste disposal

\+ Intensive recreation (parks, playgrounds, sports fields)

0 Extensive recreation (trails, bikepaths, hunting, etc.)

\+ Marine-related uses (marinas; boat launching ramps; boat rental, repairs and sales)

0 Transportation and Utilities

0 Agriculture

0 Forestry (forest management)

\+ Wildlife habitat (wildlife management)

0 Water supply

Permissible Land Uses

Primary Good

+ Low density residential 1 dwelling unit (DU) or less/acre

+ Medium density residential 1-4 DU/acre

0 High density residential > 4 DU/acres

Commercial and Office

+a. Motels
+b. Restaurants
+c. Other tourist related commercial

0 Light industry (industrial parks) > Marine related gets +

- Heavy industrial

- Sand and gravel extraction

- Waste disposal

+ Intensive recreation (parks, playgrounds, sports fields)

0 Extensive recreation (trails, bikepaths, hunting, etc.)

+ Marine-related uses (marinas; boat launching ramps; boat rental, repairs and sales)

0 Transportation and Utilities

0 Agriculture

0 Forestry (forest management)

0 Wildlife habitat (wildlife management)

0 Water supply

Permissible Land Uses

Primary Excellent

0 Low density residential 1 dwelling unit (DU) or less/acre

\+ Medium density residential 1-4 DU/acre

\+ High density residential >4 DU/acre

Commercial and Office

+a. Motels
+b. Restaurants
+c. Other tourist related commercial

\+ Light industrial (industrial parks)

0 Heavy industrial — Marine related gets +

0 Sand and gravel extraction

0 Waste disposal

\+ Intensive recreation (parks, playgrounds, sports fields)

0 Extensive recreation (trails, bikepaths, hunting, etc.)

\+ Marine-related uses (marinas; boat launching ramps; boat rental, repairs and sales)

0 Transportation and Utilities

0 Agriculture

0 Forestry (forest management)

0 Wildlife (wildlife management)

0 Water supply

Secondary Excellent

0 Low density residential 1 dwelling unit (DU) or less/acre

\+ Medium density residential 1-4 DU/acre

\- High density residential >4 DU/acre

0 Commercial and Office

a. Motels
b. Restaurants
c. Other tourist related commercial

\+ Light industrial (industrial parks)

0 Heavy industrial

\- Sand and gravel extraction

\- Waste disposal

Intensive recreation (parks, playgrounds, sports fields)

0 Extensive recreation (trails, bikepaths, hunting, etc.)

\- Marine-related uses (marinas; boat launching ramps; boat rental, repairs, and sales)

0 Transportation and Utilities

0 Agriculture

0 Forestry (forest management)

0 Wildlife (wildlife management)

\+ Water supply

Secondary Poor

N	Low density residential 1 dwelling unit (DU) or less/acre
N	Medium density residential 1-4 DU/acre
N	High density residential >4 DU/acre
N	Commercial and Office
	a. Motels b. Restaurants c. Other tourist related commercial
N	Light industrial (industrial parks)
N	Heavy industrial
+	Sand and gravel extraction
N	Waste disposal
+	Intensive recreation (parks, playgrounds, sports fields)
+	Extensive recreation (trails, bikepaths, hunting, etc.)
-	Marine-related uses (marinas; boat launching ramps; boat rental, repairs, and sales)
0	Transportation and Utilities
+	Agriculture
0	Forestry (forest management)
0	Wildlife (wildlife management)
+	Water supply

Secondary Good

+ Low density residential 1 dwelling unit (DU) or less/acre

+ Medium density residential 1-4 DU/acre

0 High density residential >4 DU/acre

0 Commercial and Office

a. Motels
b. Restaurants
c. Other tourist related commercial

0 Light industrial (industrial parks)

0 Heavy industrial

0 Sand and gravel extraction

+ Waste disposal

0 Intensive recreation (parks, playgrounds, sports fields)

0 Extensive recreation (trails, bikepaths, hunting, etc.)

- Marine-related uses (marinas; boat launching ramps; boat rental, repairs, and sales)

0 Transportation and Utilities

+ Agriculture

0 Forestry (forest management)

0 Wildlife (wildlife management)

0 Water supply

Secondary Fair

0 Low density residential 1 dwelling unit (DU) or less/acre

\- Medium density residential 1-4 DU/acre

\- High density residential > 4 DU/acre

\- Commercial and Office

a. Motels
b. Restaurants
c. Other tourist related commercial

\- Light industrial (industrial parks)

\- Heavy industrial

0 Sand and gravel extraction

0 Waste disposal

0 Intensive recreation (parks, playgrounds, sports fields)

\+ Extensive recreation (trails, bikepaths, hunting, etc.)

\- Marine-related uses (marinas; boat launching ramps; boat rental, repairs, and sales)

0 Transportation and Utilities

0 Agriculture

\+ Forestry (forest management)

0 Wildlife (wildlife management)

0 Water supply

Tertiary

+	Low density residential 1 dwelling unit (DU) or less/acre
+	Medium density residential 1-4 DU/acre
0	High density residential 4 DU/acre
+	Commercial and Office
	a. Motels b. Restaurants c. Other tourist related commercial
+	Light industrial (industrial parks)
+	Heavy industrial
0	Sand and gravel extraction
0	Waste disposal
0	Intensive recreation (parks, playgrounds, sports fields)
0	Extensive recreation (trails, bikepaths, hunting, etc.)
-	Marine-related uses (marinas; boat launching ramps; boat rental, repairs, and sales)
0	Transportation and Utilities
0	Agriculture
+	Forestry (forest management)
0	Wildlife (wildlife management)
0	Water supply

Water

The method developed to determine priority of water uses was based in large part on the guidance provided by the Office of Coastal Zone Management and the New Hampshire Office of Comprehensive Planning. Water-use suitability analyses and permissible use analyses were adapted as well.

Significant alteration to both the matrix and criteria offered by the Office of Comprehensive Planning was found necessary, largely in order to maintain uniform terminology with the water suitability and permissible use analyses. The concept of a stepped approach to priority of use identification including analysis of resource conflicts was retained, however, and forms the basis for the methodology which appears here.

It was determined that the priority designations would be applied to all identified water-uses somewhere listed as being permissible. Priority of use designations were to be applicable uniformly within each suitability area. Uses designated as permissible were ranked in order of high, medium, and low priority. Non-permissible uses were given no priority at all. This scheme was chosen instead of numerical ranking primarily because the Coastal Zone Management Act federal guidelines only calls for "broad guidelines on priority of uses in particular areas, including specifically those of lowest priority" (§ 305 (b) (5). Subsequent federal guidelines reflect this fact (15 CFR 923.14, quoted earlier). Thus, "lowest priority" is assigned to non-permissible uses. Relative priorities of high, medium, and low have been assigned to permissible uses.

Alterations in the matrix suggested by the Office of Comprehensive Planning were made as follows:

1) Uses listed were altered somewhat. The deepwater port use and single-point mooring are, for these purposes, synonymous and were combined. Ocean-dumping was added.

2) Resources listed were altered. The columns titled "seasonal variations" and "pre-empted water uses" were dropped. (These are not resources, but characteristics of uses).

New listings of resources and uses in the matrix are as follows:

Uses

Anchorage

Aquaculture

Cable areas

Commercial fishing/lobstering

Deepwater port

Ocean dumping

Pipeline

Recreational fishing/boating

Research/Education

Sand and gravel mining

Shipping

Swimming

Visual enjoyment

Resources

Living

Finfish

Shellfish

Lobsters

Marine vegetation

Non-Living

Beaches

Currents

Scenery

Sea-floor

-bathymetry

-load bearing sediments

-physical area

Water column

Water surface (physical area)

The system of checking resource dependency was retained. Additionally, an A was placed in a box where a use has a potentially significant adverse impact on other resources. The matrix was completed in that fashion.

The matrix was completed as one entity and then adapted to the permissible uses in each suitability area. Usage priorities were adjusted as follows:

1) Non-permissible uses in each area were assigned lowest priority automatically.
2) Permissible uses were scanned for resource conflicts.
   a) where no conflicts were noted, permissible uses were assigned a high, medium, or low priority according to the following criteria:
      i) impacts on natural environment
      ii) impacts on adjacent land uses
      iii) degree of dependence on resources used
      iv) affects on use of physical restriction, such as currents, shallow water, bridges, etc.
      v) impacts on water quality.

b) where conflicts were noted, the following criteria were used:

i) displaceable uses (those not critically dependent on resources) receive lower priority.

ii) non-exclusionary uses receive higher priority than those which pre-empt other uses.

iii) items i) - v) above

iv) national interest, economic need, health, safety and welfare.

Note that the criteria listed above include, and indeed are expansions of, priority of use guidelines furnished by the Office of Comprehensive Planning. Additionally, the classification scheme meets applicable federal guidelines.

Ranking of Priorities

The completed matrix is illustrated as figure 1. Every use listed, without exception, poses multiple resource use problems. Additionally, none of the uses are displaceable. (See criteria 2(a) and 2(b) (i) listed previously). Therefore, priority rankings cannot be made on that basis. Thus, non-exclusionary usage characteristics, impacts on the natural environment and on adjacent land use, the degree of dependence on resources used, effects on usage of physical restriction, and impacts on water quality become guiding factors. These have been subjectively considered. Priorities have been attached to each of the permissible water uses by capability area. The following list identifies those priorities, as well as those uses of lowest priority (non-permissible):

USE \ RESOURCE	Finfish	Shellfish	Lobsters	Marine Vegetation	Beaches	Ocean current	Scenery	Bathymetry	Load-bearing sediments	Sea floor are	Water column	Water surface	Permissible In Suitability Area: I	II	III	IV
Anchorage				A				X		X	X	X		Yes	→	→
Aquaculture	X	X	X	X		X					X		Yes	→	→	→
Cable areas								X		X				Yes	→	→
Commercial fishing/lobstering	X/A		X/A							X	X	X	Yes	→	→	→
Deepwater port	A	A	A	A	A		A	X	X	X	X	X				Yes
Ocean dumping	A	A	A	A	A					X	A	X				Yes
Pipeline	A	A	A	A	A			X		X				Yes	→	→
Recreational fishing/boating	X/A	X/A	X/A					X		X	X	X	Yes	→	→	→
Research/Education	X	X	X	X	X	X		X	X	X	X	X	Yes	→	→	→
Sand and Gravel Mining	A	A	A	A	A		A	X	A	X/A	X/A	X				Yes
Shipping	A	A	A	A		X		X				X			Yes	→
Swimming					X		X						Yes	→	→	→
Visual enjoyment *							X						Yes	→	→	→

X = depends on resource
A = potentially significant adverse impact on resource

FIGURE I - RESOURCE USAGE MATRIX

* See Figure II - Distance of Visability of Objects at Sea.

Figure II

T-13

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2.8	48	7.9	220	17.0	660	29.4	2,000	51.2
8	3.1	50	8.1	240	17.7	680	29.9	2,200	53.8
10	3.6	55	8.5	260	18.5	700	30.3	2,400	56.2
12	4.0	60	8.9	280	19.2	720	30.7	2,600	58.5
14	4.3	65	9.2	300	19.9	740	31.1	2,800	60.6
15	4.4	70	9.6	320	20.5	760	31.6	3,000	62.8
16	4.6	75	9.9	340	21.1	780	32.0	3,200	64.9
18	4.9	80	10.3	360	21.7	800	32.4	3,400	66.9
20	5.1	85	10.6	380	22.3	820	32.8	3,600	68.6
22	5.4	90	10.9	400	22.9	840	33.2	3,800	70.7
24	5.6	95	11.2	420	23.5	860	33.6	4,000	72.5
26	5.8	100	11.5	440	24.1	880	34.0	4,200	74.3
28	6.1	110	12.0	460	24.6	900	34.4	4,400	76.1
30	6.3	120	12.6	480	25.1	920	34.7	4,600	77.7
32	6.5	130	13.1	500	25.6	940	35.2	4,800	79.4
34	6.7	140	13.6	520	26.1	960	35.5	5,000	81.0
36	6.9	150	14.1	540	26.7	980	35.9	6,000	88.8
38	7.0	160	14.5	560	27.1	1,000	36.2	7,000	96.0
40	7.2	170	14.9	580	27.6	1,200	39.6	8,000	102.6
42	7.4	180	15.4	600	28.0	1,400	42.9	9,000	108.7
44	7.6	190	15.8	620	28.6	1,600	45.8	10,000	114.6
46	7.8	200	16.2	640	29.0	1,800	48.6		

Source: United States Coastal Pilot, 10th ed., Nov. 1973, Atlantic Coast Eastport to Cape Cod.

Area IV - Low development potential/low-moderate use intensity

Permissible Uses/usage priority

Aquaculture/medium

Commercial fishing and/or lobstering/low

Recreational fishing and boating/low

Research and Education/high

Swimming/medium (Class A and B waters only)

Visual enjoyment/high

Non-Permissible Uses/lowest usage priority

Anchorage

Cable areas

Deepwater port

Ocean dumping

Pipeline

Sand and gravel mining

Shipping

Area III - Low development potential/moderate-high use intensity

Permissible Uses/usage priority

Anchorage (small boat)/medium-high

Aquaculture/medium

Cable area/low

Commercial fishing and lobstering/medium

Pipelines/low

Recreational fishing and boating/high

Research and Education/medium

Swimming/high

Visual enjoyment/high

Non-Permissible Uses/lowest usage priority

Deepwater port

Ocean dumping

Sand and gravel mining

Shipping

Area II - Fair development potential/moderate-high use intensity

Permissible Uses/usage priority

Anchorage/medium-high

Aquaculture/medium

Cable areas/medium

Commercial fishing and lobstering/high

Pipeline/low

Recreational fishing and boating/high

Research and Education/medium

Shipping/high

Swimming/low

Visual enjoyment/high

Non-Permissible Uses/lowest usage priority

Deepwater port

Ocean dumping

Sand and gravel mining

Area I - Good development potential/moderate-high use intensity

Permissible Uses/usage priority

Anchorage/medium

Aquaculture/medium

Cable areas/medium

Commercial fishing and lobstering/high

Deepwater port/medium

Ocean dumping/low

Pipeline/medium

Recreational fishing and boating/high

Research and Education/medium

Sand and gravel mining/low

Shipping/high

Swimming/low

Visual enjoyment/medium (from shore)

W.P.

ALTERNATIVE PROCEDURES AND INDICES FOR DETERMINING PERMISSIBLE LAND AND WATER USES

Prepared by
STRAFFORD ROCKINGHAM REGIONAL COUNCIL

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ALTERNATIVE PROCEDURES AND INDICES FOR DETERMINING PERMISSIBLE LAND AND WATER USES

The methods used by the staff of the Strafford Rockingham Regional Council to lead to a determination of permissible land and water uses are fully described in the material submitted in compliance with paragraph 2B of this contract. Those methods include a land use capability model based on the intrinsive suitability of various land areas for various activities and a water use suitability analysis based upon a capability analysis where possible and otherwise on a suitability analysis.

One basic alternative to the methods actually used is the "traditional" land use planning approach. The traditional approach begins by making projections for the population of an area, then works to allocate these people, and a corresponding amount of industrial and commercial land, commercial land, open space land is also recommended for reservation, and transportation systems are devised to tie it together All is predicated on the best estimate of future population.

The approach used here, by contrast, starts with the capability of the land to support various activities and can conclude with an estimate of the maximum population that can be accommodated in a given region. This maximum may exceed,or be greatly below,a projection derived under the traditional land use planning method.

Both methods weigh existing uses heavily in their considerations for areas already inhabited.

No other technical methods were discovered that could be of use in this planning process.

There are, however, many possible alternative refinements to the capability-suitability analysis. The goal of all of them is the determining the basic natural capability of the land and water to support man's uses. The end measure is "carrying capacity".

A variety of procedures has been suggested to reach numerical estimates of "carrying capacity" for various coastal areas. All suffer from man's basic lack of knowledge about the effects of various activities on coastal areas.

The basic problem with reliance on the natural factor approach is that not enough scientific study has been done on various parts of the coastal waters to arrive at many firm conclusions, nor has enough study been done on New Hampshire coastal areas in particular, to predict, with great accuracy, the impacts of various uses in various places. Such a determination, if possible, would cost hundreds of millions of dollars and take many years.

Decisions on use of coastal land and waters must be made immediately and can not wait for such a determination, even if possible. Consequently much carrying capacity decision-making will be on a trial and error basis. The carrying capacity of a land or water area will be recognized when it is in fact reached but, in many instances, will not be entirely predictable.

Some carrying capacities are known, however, within various degrees of certainty. These "knowns" have been utilized in the work under this contract to arrive at the recommendations for permissible uses.